THE EFFECT OF ORGANIZATIONAL PROCESSES ON THE STRATEGY TO INTRODUCE NEW TECHNOLOGY INTO RETAILING

Submitted By

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ABSTRACT

THE EFFECT OF ORGANIZATIONAL PROCESSES ON THE STRATEGY TO INTRODUCE NEW TECHNOLOGY INTO RETAILING

Despite the widespread changes that are taking place in retail technology, it is an area which has been subjected to relatively little research. In particular, there has been a neglect of the process of introducing new technology. Based on a comparative study of two supermarket chains, this thesis examines the way in which technology is introduced into retail companies and the problems they encounter. The technology in question consisted of the computerisation of all head office and warehouse systems and the introduction of Electronic Point of Sale (EPOS) and Portable Data Capture Units (PDCs) into the branches. Research methods included participant observation, interviews and analysis of documents.

The study found that the introduction of new technology was not the result of a rational, pre-determined strategy, but that it evolved from a series of ad hoc decisions. Organizational processes played an important part in forming this emerging strategy and also influenced its successful implementation. In particular, power, politics, conflict, communication and commitment were identified as key processes. Further research into these issues showed that they could be attributed to four major factors: the decline of the organization; ownership of the company; an uncertain environment and the organization structure.

The research provided valuable empirical evidence to support or refute ideas developed in previous works on new technology. The major contribution of the thesis lies in the insights it gives into the complex interaction of strategy formation, organizational processes and the underlying factors. The thesis demonstrates how the four major factors, in particular organization structure, gave rise to the processes which subsequently influenced the emerging new technology strategy and affected the companies' ability to sucessfully exploit the benefits.

CATHERINE J CROMBLEHOLME JULY 1988

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1. INTRODUCTION

This introductory chapter sets the scene for the rest of the thesis. It explains how the research began and the principles on which it is based. It gives a brief overview of the key elements of the thesis and its relationship with existing literature. In addition, it describes how the thesis is structured and outlines the content of each chapter.

COLLABORATIVE RESEARCH

The research was funded by the Economic and Social Research Council (ESRC) under their Collaborative Award in the Social Sciences (CASS) scheme. The aim of the CASS scheme (according to the ESRC Studentship Handbook) is 'to foster closer links between social scientists and non-academic organizations'. The researcher is required to spend a minimum of three months with the collaborating body.

The collaborating body in this research was Laws Stores Ltd of Gateshead, a medium-sized, regional, supermarket chain, operating 45 branches in the North East of England and Southern Scotland. The company, established in 1907, was still privately owned and managed by descendants of the founder.

This type of collaborative research has many benefits, not least of which is immediate access to a company, something

which many researchers spend months negotiating. It also provides a valuable opportunity to study the 'real' problems faced by an organization. A further benefit is the high level at which access is gained. In their 'Notes For Potential Applicants and Collaborating Bodies', the ESRC state 'it will normally be expected to provide a liaison officer at a reasonably senior level within the organization'. In this case, the Personnel Director was the liaison officer. He performed a vital role in 'opening doors' for the researcher into all areas and levels of the company. These factors combined to allow the researcher a good insight into the workings of an organization.

There are also drawbacks associated with such close co-operation between the researcher and the organization under investigation. The first is that the two parties may have differing, and contradictory, expectations of the research. Fortunately, such a problem did not arise in this study, largely because the Chairman of Laws had a strong interest in, and appreciation of, academic research. The second drawback is that, because the research involves a 'live' situation, many events are outside the researcher's control. The study is therefore susceptible to any change in the organization's circumstances and must be adapted accordingly. Fifteen months after the research with Laws Stores began, the company underwent a drastic change (details of which are given in Chapter 10). From the point of view of the research, this caused some short-term difficulties, but these were soon overcome. By adapting the research to the

change in circumstances, whilst still retaining the overall aims, it was possible to turn the situation to advantage.

To explain the context in which the research took place it is necessary to give a brief overview of the environment in which Laws operated, ie the retail trades.

THE RETAIL TRADES

The distributive industry (of which retailing forms a large part) plays an important role in the UK economy, it contributed 13.3% to GDP in 1986. Retailing employs over two million people, 8% of the workforce, and as such is the country's third largest sector of employment (Annual Abstract of Statistics, 1988).

The importance of retailing had not been recognised until recently, when concern began to be expressed about the decline of manufacturing in the UK and the corresponding increase in service industries. Furthermore, retailing has only recently been recognised as a field of academic study. This is illustrated by a number of recent developments, for example the establishment of the Institute for Retail Studies at Stirling in 1983 and the Oxford Institute of Retail Management in 1985. Chairs in retailing have also been created, at Stirling University and at Brighton Polytechnic. The upsurge in academic interest has also been reflected by the founding of the International Journal of Retailing in 1986.

The significance of the retail industry however, lies not only in its size, but also in its dynamism. This has been caused by such things as social changes and more discriminating customers; greater emphasis on design and merchandising; a large number of acquisitions, resulting in an increased share of the market for multiples; and more sophisticated management techniques.

These changes have probably been most marked in the grocery retailing sector. In the period 1961-1986 the multiples' share of the market increased from 27% to 72%, whilst the independents' declined from 53% to 17%. The size of supermarkets has also increased dramatically, with an associated trend away from the high street to out-of-town sites.

The most dramatic change, and one with far reaching implications, is the introduction of new technology. Many of the major supermarket chains introduced data processing facilities into their head offices in the 1960s. By the early 1980s, with the advent of microelectronics and improved data communications, they were introducing (or at least contemplating) laser scanning and were reviewing ways of using the massive amounts of management information generated. Whilst these changes took most companies over 20 years, Laws Stores attempted to make the transition in less than two. A head office computer was installed in 1982 and in 1984 laser scanning was installed into two branches on a trial basis. Understandably, such rapid developments were not achieved without difficulties and thus provided a fertile area for research and an

opportunity to make a contribution in the previously under-researched area of retail technology.

NEW TECHNOLOGY

New technology has been a key element in the changes in retailing. Much has been written, both in the popular and academic press, about technology, often referred to under a confusing variety of terms, such as 'new technology', 'information technology' and 'microelectronics'. It is necessary, therefore, to clarify what is meant by technology in this context. The technology used by Laws Stores consisted of two main elements, head office systems and in-store systems.

Shortly before the research began, an IBM mini-computer was installed in Laws Stores' head office and work began on transfering all administrative, financial and management information systems onto this. The IBM System 38 that was purchased was a 'state of the art' machine requiring little technical support but, as the systems were on-line, considerable involvement was required from the user departments. This technology (ie the hardware and the software) was not fundamentally different from that which could be used by any company's head office, although some systems, such as warehousing and purchasing, were specifically tailored to retailing.

The other element of the technology, the in-store systems, were specific to retailing. These consisted of Portable Data Capture (PDC) units, which were introduced into all

branches of Laws during the period of the research, and Electronic Point Of Sale (EPOS) systems, which were introduced into two branches. PDCs are hand-held battery powered units, similar to large calculators, which are used to capture the store's order and transmit it, via the telephone lines, to head office. EPOS systems consist of sophisticated electronic cash registers with the ability to capture data on the merchandise sold and store it for processing by a computer. In supermarkets, data is captured by means of a barcode on each item which is read at the checkout by a laser scanner, hence they are often referred to as laser scanning systems.

THE RESEARCH PROCESS

The study did not conform to a 'traditional' model of the research process. This is often illustrated as a series of logical, sequential, discrete steps leading from selection of the research topic, through literature searching, collection and analysis of the data to presentation of the findings (Howard and Sharp 1983). Given the unusual opportunity of immediate access to a company, advantage was taken of this situation to enable the researcher to study 'real world' problems. Therefore, the first stage of the research involved investigation into the company to discover just what those problems were. Information was sought on company operations, how new technology fitted into the organization, how this technology was introduced and any problems resulting from its introduction. The methods used included observation, analysis of documents and unstructured interviews. As

problems and issues were identified in the organization, continual reference was made to the existing body of literature on the relevant subjects. This shed light on some areas of the research and also revealed gaps in previous works. In this way, by undertaking empirical research and literature searching simultaneously, it was possible to identify a topic which was both a 'real' problem for Laws Stores as well as an area which had not been adequately covered in previous work.

The major problems and issues at Laws were found to involve the organizational processes by which the strategy to introduce new technology was formulated and implemented. These processes included communication, conflict, internal politics and commitment to the changes. A review of literature on new technology found there to be very little work on the strategy and implementation of new technology and the processual viewpoint was also lacking. Therefore, this area was chosen for further research in Laws Stores. The aim was to investigate the nature of these organizational processes, the factors which gave rise to them and their subsequent effect on the strategy to introduce new technology.

Once again, several methods were used to collect data, although these were now focused on the specific processes outlined above, in particular more structured interviews were used to facilitate greater probing of the relevant issues. This was followed by a comparative study in another supermarket chain, Wm Low & Co plc. Although similar to Laws in many respects, Wm Low was significantly

different in others, especially its approach to new technology. In total, 90 days were spent with Laws Stores between October 1983 and May 1985, this was followed by four one-week periods with Wm Low & Company plc.

LITERATURE REVIEW

Much of the literature on technology and automation from the 1960s and early 1970s tended to concentrate on manufacturing industry, for example Woodward (1965), Pugh et al (1968). Little attention was paid to the service industries and retailing in particular. One notable exception to this is the work of Pettigrew (1973) who studied the decision to introduce a computer into a retail organization, however he did not emphasize the retailing aspect of the study. The more recent works dealing with the advent of microelectronics have also tended to concentrate on manufacturing, for example Bessant and Dickson (1982) note that, 'our main concern in this book is with the application of microelectronics to manufacturing processes'. This is despite the fact that microelectronics has had a major impact on the service sector.

With the increased trend towards the automated office some recent publications have dealt with service industries and occasionally retailing. However, many of these have taken a macro view, looking at the spread of microelectronics through a particular industry or worldwide (Dawson 1983). They have generally looked at the impact of new technology, in particular the effect on industrial

relations issues such as control in the work place (Sawers 1984).

Recently, there has been an increase in publications on retail technology and EPOS in particular. The outstanding feature of these works is that they all largely cover the same ground and rarely come up with anything new. They fall broadly into three camps. (There are, of course, a few exceptions to these generalisations which will be discussed later).

First, is the 'technical' literature (RMDP 1982, Brown 1986, Euromonitor 1985), outlining possible equipment suppliers, their systems and capabilities. These works provide a vital source of information, but cover only one side of the coin - the 'hard' aspects of retail technology, rather than the 'soft' organizational and inter-personal issues associated with its introduction.

Second, are the works which tend to be largely prescriptive (Distributive Trades EDC 1982, OFT 1982). These are mostly optimistic reports highlighting the potential benefits of EPOS and urging the retailer to invest in the new technology. They are rarely based on any original empirical research and are generally lacking in any systematic analysis or objective content.

On the other hand there are the pessimistic reports, investigating the impact of retail technology on employees (EFILWC 1983). Many of these appear to be written from an ideological standpoint, 'proving' that technology can

bring 'serious risks to the workers involved' (FIET 1985). The empirical basis is often superficial, demonstrating little knowledge of retailing or the technology, with results chosen to support the author's a priori assumptions.

Through the researcher's own investigations in Laws Stores and through attendance and discussion at seminars and conferences, it would seem that the new technology is not quite so deterministic. It does not automatically lead to benefits for the retail organization, nor the alienation of the checkout operator. Whilst there are potential benefits of EPOS, problems arise during the implementation process. This often prevents the retailer from fully realising all the cost advantages which would give a satisfactory return on such a large investment.

The above literature failed to explain what was taking place at Laws Stores. The actual introduction and implementation of new technology into a retailing organization, the problems which arise and the way in which full benefit can be achieved was not adequately covered by previous research. With good access to a company which was introducing new technology, the researcher was in an ideal position to undertake a detailed study of this process.

PRESENTATION OF THE FINDINGS

In keeping with the 'real world' model of the research, the results are not presented as a series of hypothesis,

which are then measured and tested in the field. In this thesis a picture of the relevant data is gradually built up, as it was in the actual research. The specific issues identified during the introduction of new technology are related to the more generalised context of the organization, its structure and environment. The final product is an explanatory network of the influences and relevant factors affecting the retail company's strategy to introduce new technology and the successful implementation of that strategy.

STRUCTURE OF THE THESIS

The thesis is divided into two parts. Part I presents the background to the research and Part II deals with the case studies, analysis of the findings and conclusions.

The thesis begins, as the research did, with the collaborative organization, Laws Stores. Following this introduction, the second chapter reviews the environment of grocery retailing in which the company operated. The third chapter investigates the characteristic features of supermarket chains and the principles on which they base their organizations. The fourth chapter presents background information on Laws Stores and illustrates the extent to which it conformed to such principles, it provides details of the technology which was used in addition to the structure and ownership of the organization. The fifth chapter deals with the research methodology, it explains the principles on which the research is based and the practical problems which had to

be overcome. The sixth chapter presents and analyses the relevant literature on new technology and organizational behaviour.

In part II, Chapter 7 describes the introduction of new technology into Laws Stores. It covers the three year period from the initial computer proposal, through installation of the various systems, to the operation of laser scanning. Chapter 8 analyses the strategy to introduce new technology, the organizational processes which gave rise to that strategy and the problems which were encountered. Chapter 9 then relates these issues to the wider context, including ownership of the company, its structure and the environment in which it operated.

Chapter 10 discusses the history, ownership and structure of Wm Low, focusing on the strategy to introduce new technology and proposals for future developments. Chapter 11 draws together the various threads of the thesis by comparing the findings in Wm Low with those in Laws Stores. It contrasts the different strategies for introducing new technology and the factors affecting those strategies.

The thesis concludes with a summary explanation of events in Laws Stores and the applicability of the findings to other organizations. In addition, it discusses the contribution to existing theory and some implications for further research.

2. BACKGROUND TO THE CASE STUDY

This chapter discusses the role of the environment in shaping the decisions of a company. It addresses such questions as: to what extent does the environment determine the actions of a company? How can the company itself affect the environment? The purpose of this chapter is to explore the retail grocery sector and facilitate a greater understanding of the changes that were taking place and the context in which decisions at Laws Stores were made. Particular attention is paid to recent trends in retailing, such as the size and location of stores, trade structure, merchandising techniques, and the technological changes that were taking place.

The organization can be seen as an open system (Katz and Kahn 1978) involved in a process of continual interaction with its surroundings. Some writers (Miles and Snow 1978, Burns and Stalker 1961, Lawrence and Lorsch 1967) emphasize the importance of this relationship and stress that the organization and the environment must fit well together in order for the company to be successful, an approach which will be outlined in Chapter 6. Other writers take the view that rather than adjusting to fit it, the company can 'enact' its own environment (Weick 1969, Child 1972). They argue that this relationship is determined by the particular choices made by the organizational decision-makers and by the constraints which more dominant counterparts impose upon them.

It is this latter aspect which is crucial, it is possible for leading supermarket operators, J Sainsbury, Tesco and Asda, to shape the grocery retailing environment by utilising their considerable resources, financial and otherwise, and through their power over suppliers, competitors, planning authorities and even to a certain extent consumers. However, as Table 2.1 illustrates, Laws Stores was small in comparison to the leading supermarket chains with only a fraction of their sales, profit and market share. It was, therefore, unable to exercise much power over suppliers, competitors and planning authorities. Owing to its lack of resources, both financial and otherwise, Laws was rarely able to shape the market in which it operated, particularly in the short and medium term. Therefore, for the purposes of this thesis, the environment in which Laws operated is considered to be predetermined and any decisions which the company took were seen as a reaction to that environment and an attempt to prosper within it.

THE GROCERY RETAILING INDUSTRY

The importance of the distribution industry, and retailing in particular, was noted in Chapter 1. Within this, food retailing is the largest employer, accounting for 29% of all employees in the retail sector in 1986. The significance of food is also illustrated by its large share of total retail turnover (38%) and consumer expenditure (18%) (Annual Abstract of Statistics 1988). The whole of the retail industry has undergone a number of changes in recent years. These include variations in

Comparative Size of Supermarket Chains (1983) Table 2.1

SUPERMARKET CHAIN	FINANCIAL YEAR ENDING	SALES £M	PROFIT £M	NUMBER OF STORES	NUMBER OF EMPLOYEES (000'S)	MARKET SHARE (%)
TESCO	FEB 1983	2277	53.5	489	40.4	12.9
J. SAINSBURY	FEB 1983	2201	106.9	263	33.3	12.3
ASDA	APR 1983	1318	77.4	82	30.0	6.9
FINE FARE	MAR 1982	820	25.8	594	N/A	4.9
INTERNATIONAL STORES	DEC 1983	692	6.7	410	N/A	3.5
SAFEWAY	SEP 1983	597	24.1	98	11.8	3.1
KWIK SAVE	AUG 1983	556	27.4	345	4.8	3.0
PRESTO	MAR 1983	510	TOTAL ARGYLL 21.3	TOTAL ARGYLL 1111	TOTAL ARGYLL 28.7	2.9
LIPTONS	MAR 1983	400				
WAITROSE	JAN 1984	488	12.5	76	10.6	2.5
WM MORRISON	JAN 1984	270	10.0	30	5.2	1.4
HILLARDS	APR 1983	193	5.8	42	N/A	1.1
GRANDWAYS	APR 1983	136	1.1	90	N/A	0.9
WM LOW	SEP 1983	133	3.9	61	4.3	0.7
AMOS HINTON	MAR 1983	113	2.0	54	N/A	0.7
CARREFOUR	FEB 1982	123	TOTAL DEE 17.8	6	TOTAL DEE 11.6	0.6
DEE DISCOUNT	MAY 1982	95		70		0.6
BUDGENS	DEC 1983	100	N/A	105	N/A	0.5
BISHOPS STORES	FEB 1984	89	N/A	63	N/A	0.5
LAWS STORES	APR 1983	51	(0.5)	53	1.9	0.3

Source : ICC (1984), Food Retailing (1987), Newcastle Journal 9 January 1985, Company Reports.

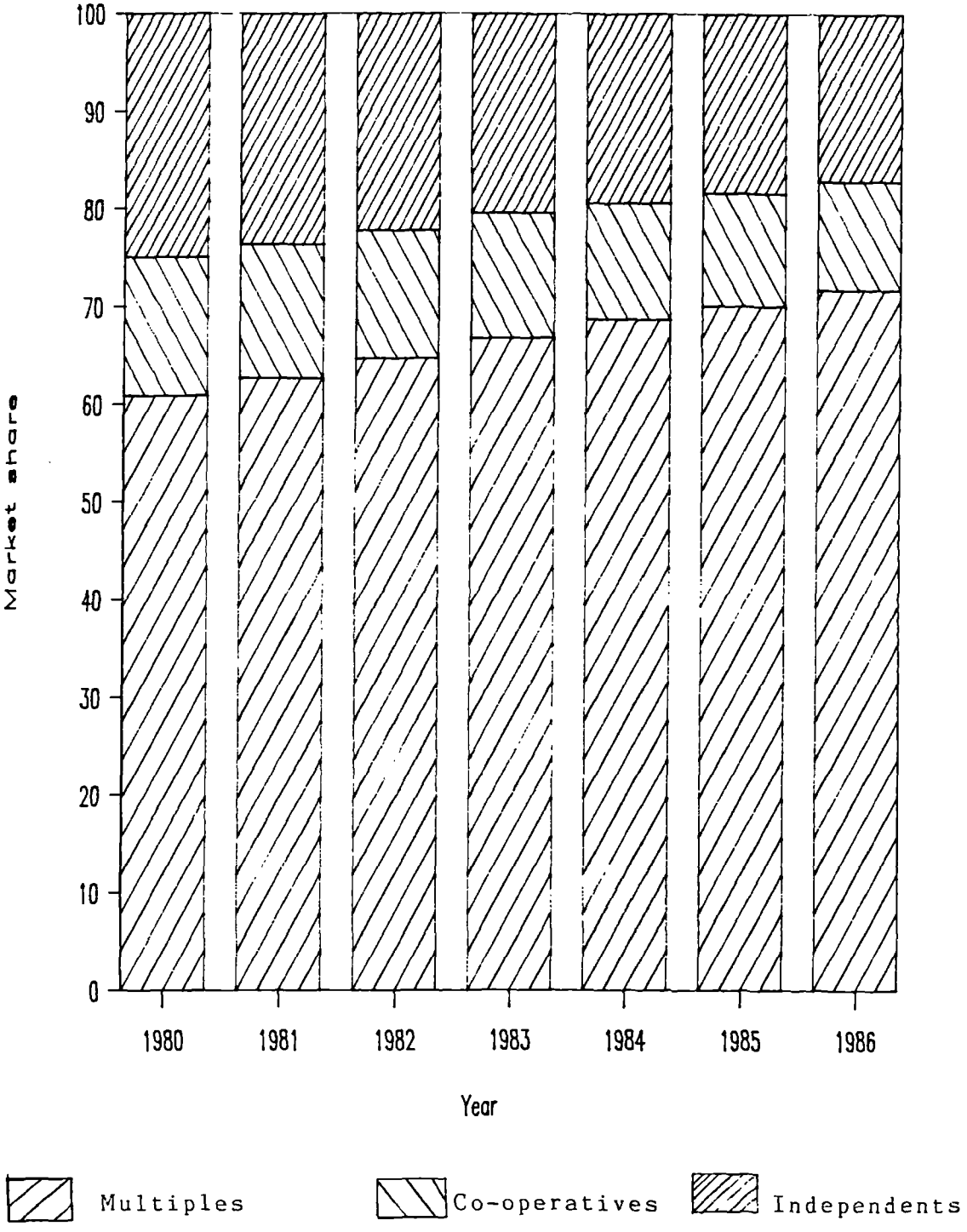
trade structure, marketing trends, centralised control and the use of new technology. Such changes will be illustrated below with reference to the food retailing industry in which Laws operated.

TRADE STRUCTURE

Grocery retailers can be divided into three major groups: the independent companies with less than ten outlets, some of which belong to symbol groups such as Mace Wavy Line, Spar or VG; the co-operatives, which in 1986 consisted of approximately one hundred different societies of varying sizes and the multiple sector, comprising chains with ten or more outlets. The latter may be further sub-divided into the major multiples, for example Argyll, Dee, Sainsbury, Tesco, and the smaller, mainly regional multiples, such as Wm Jackson, Morrisons, and Wm Low.

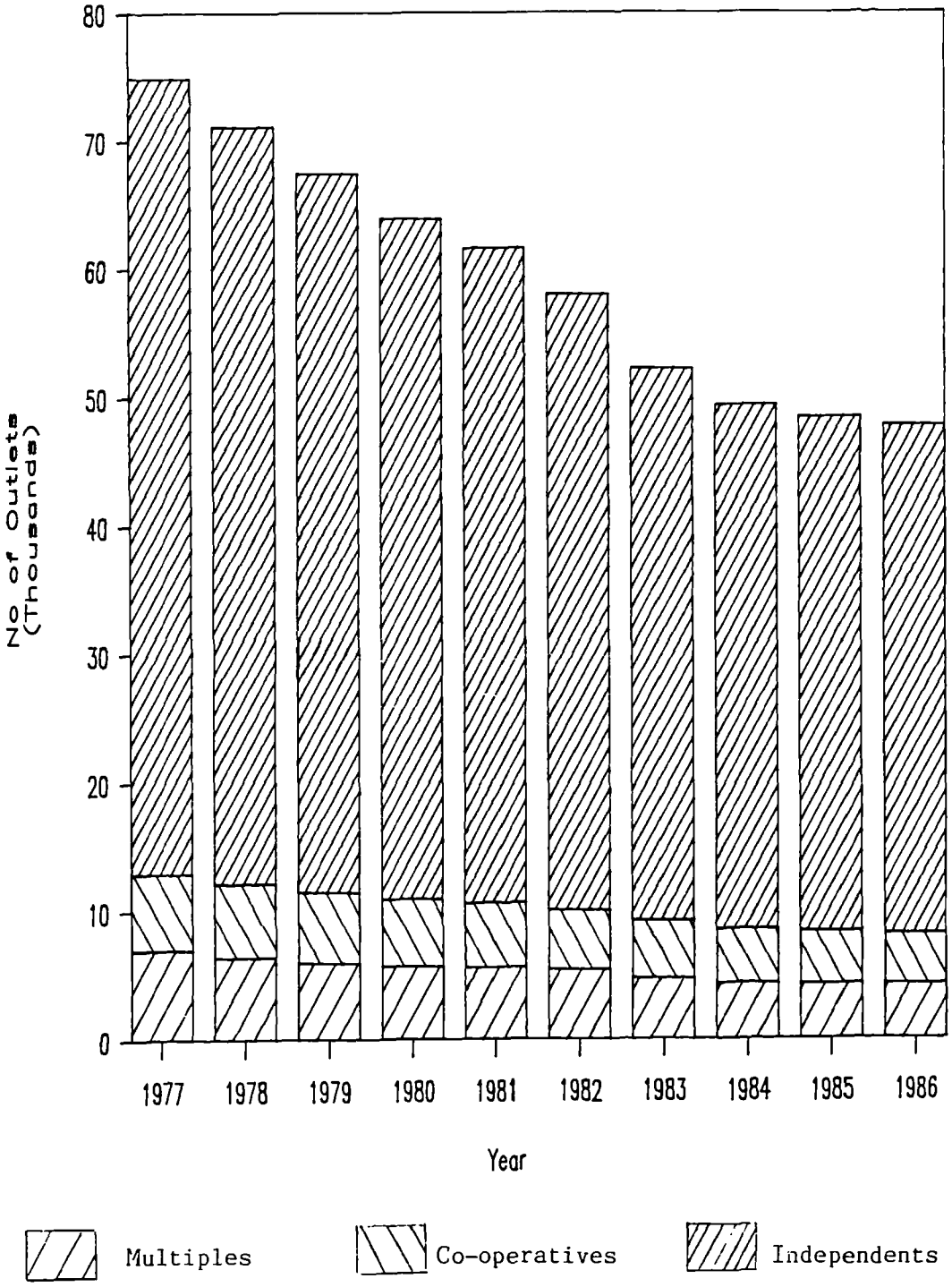
The most pronounced trend in the retail grocery trade in recent years has been the increase in the market share of the multiples, at the expense of the co-operatives and the independents. Figure 2.1 shows that the multiples' share of trade has increased from 60.9% in 1980 to 71.8% in 1986, whilst the co-operatives' share has declined from 14.2% to 11.1% and the independents' from 24.9% to 17.1%. Coupled with this shift in market share has been a 36% decrease in the number of retail grocery outlets between 1977 and 1986 (Figure 2.2). Although many of the changes have effected the whole of the grocery retailing industry, some are more applicable to the different sectors and will

Market Share 1980-1986 Figure 2.1



Source: Nielsen Grocery Trade Report 1987

Number of Grocery Retail Outlets 1977-1986 Figure 2.2



Source: IGD Food Retailing 1987

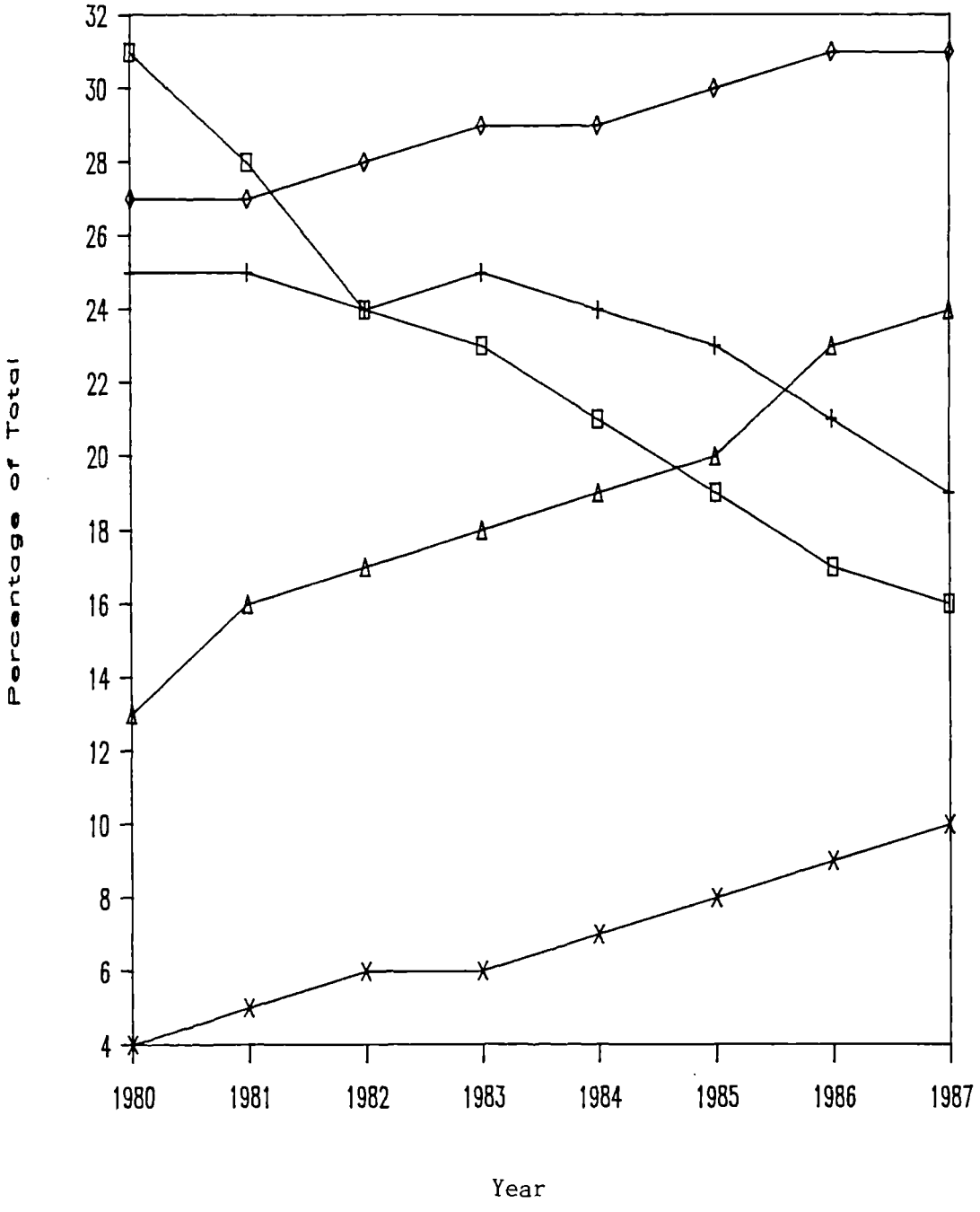
therefore be addressed under the headings of multiples, co-operatives and independents.

Multiples. Most multiple grocery chains have undertaken an extensive rationalisation programme since the early 1970's, closing many small high street stores and opening fewer, but much larger and therefore more cost effective stores on the outskirts of towns. Figure 2.3 shows that the number of stores below 4,000 sq ft has decreased significantly, whilst those over 10,000 sq ft are steadily increasing in number. As a result of these trends, the average sales area of multiple stores was 10,875 sq ft in 1986, compared to 5,284 sq ft in 1977 (Figure 2.4). Table 2.2 shows that the location of new stores has also changed, with local and neighbourhood centres decreasing in favour of edge of town and free standing locations.

Tesco has probably undertaken one of the most drastic rationalisation programmes. The average store size increased from 6,000 sq ft in 1975 to 18,000 sq ft in 1985, whilst over the same period the number of outlets dropped from 771 to 369 (Marketing Week June 1985).

Co-operatives. The co-operative societies were later than the multiples to realise the need to carry out changes. At the co-operative conference in 1982 a vote was passed to reduce the number of societies to twenty-five within two years. Whilst it did not achieve this, the number was reduced, through a series of mergers, from 206 in 1980 to about a hundred in 1986. The movement undertook a comprehensive programme of store rationalisation, closing

Store Size Profile of Multiple Stores 1980-1986 Figure 2.3

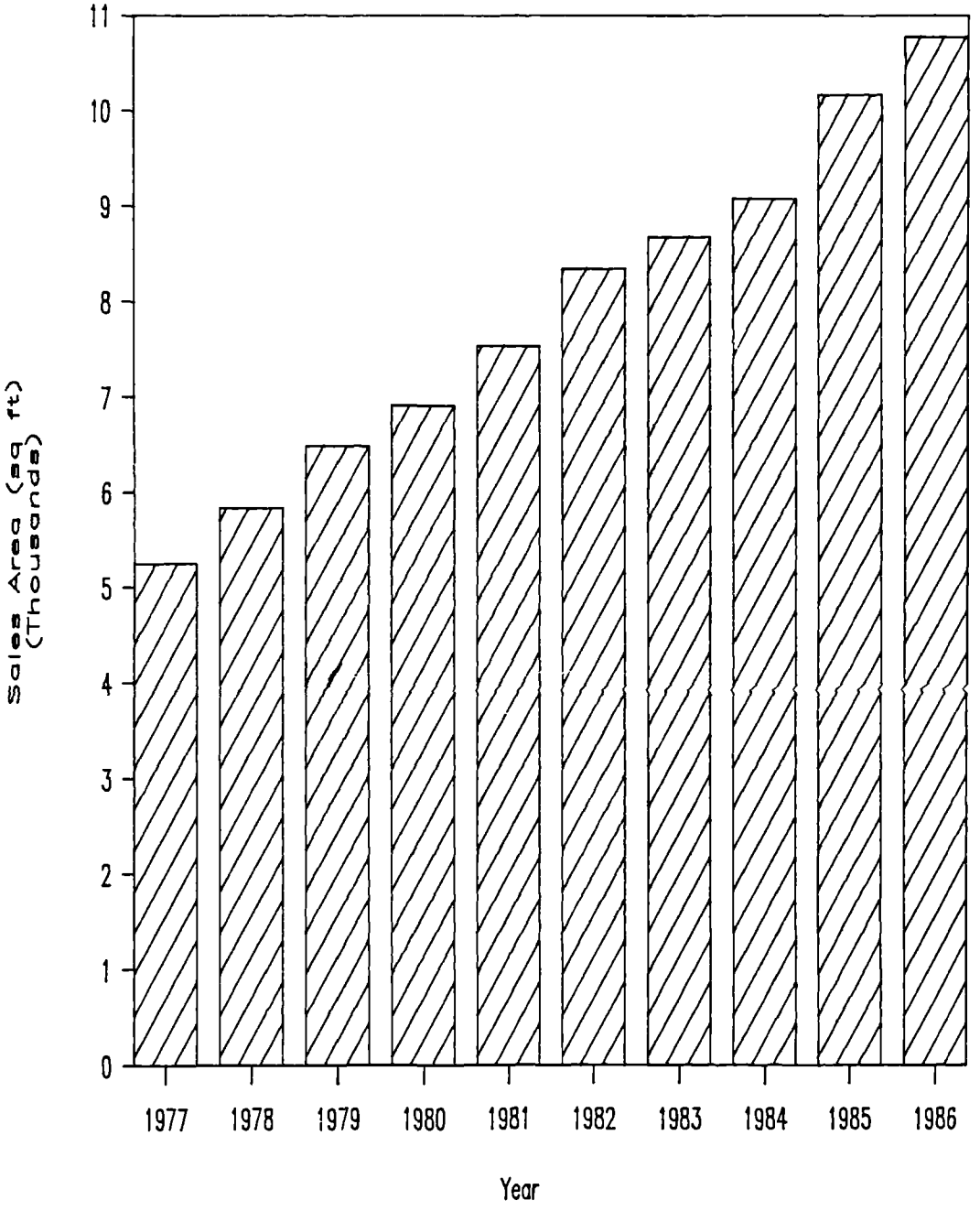


□ Below 2,000 sq.ft. + 2 -3,999 sq.ft. ◇ 4 - 9,999 sq.ft.

△ 10-24,999 sq.ft. X 25,000 + sq.ft.

Source: IGD Food Retailing 1987

Average Sales Area of Multiple Stores 1977 - 1986 Figure 2.4



Source: IGD Food Retailing 1987

Type of Site - New Multiple Superstores 1980-1986 Table 2.2

Site Type	1980	1981	1982	1983	1984	1985	1986
Purpose Built Shopping Centre	25	48	14	32	33	24	27
Traditional High Street	16	7	29	5	4	21	18
Local/Neighbourhood Centre	16	4	14	5	8	0	6
Edge of Town/ Free Standing	25	41	43	59	55	52	46
Other	18	0	0	0	0	3	3
TOTAL	100	100	100	100	100	100	100

Source: IGD Food Retailing 1987

Size Profile of Co-op Stores, 1980-87 Table 2.3

SALES AREA (SQ FT)	STORE PROFILE AS AT 1 JANUARY (COL. %) 1980	1981	1982	1983	1984	1985	1986	1987
< 2,000	62.9	60.8	58.5	57.0	54.7	51.9	49.1	46.7
2- 3,999	23.9	24.5	25.7	25.5	26.0	26.8	27.8	28.6
4- 9,999	10.4	11.4	11.7	13.0	13.7	14.5	15.9	17.1
10-14,999	1.3	1.4	1.8	2.0	2.1	2.7	2.6	2.8
15-19,999	0.4	0.5	1.0	1.3	1.6	1.5	1.6	1.7
20-24,999	0.1	0.1	0.3	0.4	0.6	0.6	0.8	0.9
25,000 +	0.9	1.2	0.9	0.9	1.5	2.0	2.1	2.2
T O T A L	100	100	100	100	100	100	100	100

Source: IGD Food Retailing 1987

over 1,000 food stores in two years. At the same time it increased its superstore presence at twice the national average to become the third largest superstore operator in the U.K. in 1986. Table 2.3 shows that the larger co-operative stores increased in percentage terms between 1980 and 1987, however, those under 2,000 sq ft remained the dominant sector.

Independents. Whilst the co-operative societies have a considerable resource base from which to be able to build their larger stores, this is not usually the case for the independents and the small multiples. They lack economies of scale because of their limited buying power and smaller stores, and therefore have to look for alternative means of survival in this highly competitive industry. Many of the independents are affiliated to one of the symbol groups such as Mace Wavy Line, VG or Spar. This provides them with increased buying power and a pool of expertise on which to draw for advice on financial matters, merchandising and technology. For the regional chains and independents there is the option of joining NISA (National Independent Supermarket Association) which, with a membership of 352 companies, 1,782 branches and a turnover of approximately £2 billion in 1987, has considerably more buying power than each company would have individually.

An alternative strategy for the independent or small multiple is to exploit a particular niche within the market which is not in direct competition with the larger supermarket chains. One such policy is the convenience store approach, ideal for smaller outlets in high street

and suburban estate locations. These stores, which the IGD estimated a total of 2,500 in 1987, have extended opening hours, including weekends, carry a broad range and are able to charge a premium price. Many of the convenience stores which have been established in the 1980s are under the umbrella of the symbol groups, for example Spar's Eight-till-Late, or have grown 'from the roots of a floundering grocery chain' such as Cullens (RDM Nov/Dec 1985). However, these are also coming under pressure from the larger chains such as 7-Eleven, an American owned organization with stores worldwide including 7,000 in the US and 2,000 in Japan.

MERGERS AND ACQUISITIONS

One 'final' option for grocery retailers who see no long-term future for themselves in this highly competitive industry is to merge with, or be acquired by, a larger competitor. Mergers and acquisitions have played a very significant part in changing the structure of the trade in recent years by adding considerably to the degree of concentration that has occurred. Many of the trading names were retained during the early 1980s, although they were grouped under common ownership. However, by 1987 most of these had been rationalised with companies operating under one or two major fascias. Table 2.4 shows major acquisitions by food retailers between 1980 and 1987. This relates mainly to takeovers of food retailers and some major non-food retailers in the U.K. As it does not cover unsuccessful bids, takeovers outside retailing or those outside the U.K., it tends to understate total

Major Acquisitions by Food Retailers 1980-1987 Table 2.4

COMPANY	CURRENT MAJOR TRADING NAMES	ACQUISITIONS (since 1980)	PREVIOUS TRADING NAMES
Argyll Group	Safeway Presto Lo-Cost Cordon Bleu	Freezer Fare (1980) Price-rite (1980) Allied Suppliers (1982) Amalgamated Distillers Products (1983) Amos Hinton (1984) Safeway (1987)	Freezer Fare Price-rite Liptons, Templeton Hintons, Winterschladen
Asda Group	Asda	MFI (1985)	Wades (sold 1985) MFI (sold 1987)
Associated British Foods	----	Crazy Prices (1982)	Fine Fare/ Shoppers Paradise (sold 1986) Crazy Prices
Barker & Dobson	Budgen	Budgen (1986)	
BAT Stores	----		Price-rite (sold 1980) Mainstop (sold 1982) John Quality (sold 1984) Country Market (sold 1983) International (sold 1984)
Booker	Booker (Wholesale)	Bishops (1984) John Quality (1984)	Budgen (sold 1986) Rusts (sold 1982) Bishops Zipin!/ John Quality (sold 1986)
Dee Corporation	Gateway	Key Markets (1982) Frank Dee (1983) Lennons (1984) International (1985) Fine Fare (1986) Woolco (1986)	Carrefour Key Markets Frank Dee Supermarkets Lennons International Fine Fare Woolco
Tesco	Tesco	Bugden (1985) Hillards (1987)	Tesco Stores Ireland (sold 1986) Victor Value (sold 1986) Bugden Hillards

Source: Derived from IGD Food Retailing 1987.

activity within the industry. Argyll and Dee are the two most prominent supermarket companies whose expansion has resulted from a series of acquisitions, compared to such companies as Sainsbury and Tesco who prefer more organic growth based on extending older stores and building new ones.

Argyll has a history of mergers and acquisitions going back to the 1960s when Allied Suppliers was formed out of such companies as Meadow, Maypole, Liptons, Templeton and Galbraith. Argyll acquired Allied Suppliers in 1982 and two years later purchased Hintons. In 1985 it began to rationalise its trading names to Presto and Lo-cost. In 1987 Argyll acquired Safeway from its American parent company and began to convert the larger Presto stores to this format.

The other major acquisitor, Dee, described by one report as a 'corporate boa constrictor' (Marketing Week, August 2 1985) because of its ability to 'digest' companies larger than itself, successfully resisted a takeover bid by Argyll in 1981. In 1984, following acquisitions of Key Markets, Frank Dee Stores and Lennons, Dee doubled its supermarket presence by purchasing 380 International Stores from British American Tabacco (Financial Times January 22 1985). Its bid for Booker McConnell failed, but in 1986 it purchased Fine Fare from Associated British Foods and in 1987 announced the conversion of all its stores to the Gateway fascia. Early in 1988 it again successfully resisted a takeover bid, this time from Barker and Dobson.

Competition in the retail grocery trade is particularly strong in the North East of England, with the North East Co-operative Society, Tesco, Dee Corporation, and Argyll as the main competitors in the early 1980s, and more recent entries being made into the area by Asda and Morrisons. It is not surprising, therefore, that the local supermarket chains felt the pressure, with Hintons selling out to Argyll in 1984.

MARKETING TRENDS

The major multiples have tried various marketing methods in order to improve turnover and profit margins. In the late 1970s the competitive emphasis was on price. When Tesco launched 'Operation Checkout' in 1977, store traffic increased by a million customers a week and market share rose from eight to twelve per cent by the end of the year. Sainsbury responded the following year with 'Discount '78' and soon all the major multiples had some sort of price cutting campaign. Ten years later however, apart from the limited line discount chains such as Kwik Save, price is no longer the major selling point, the emphasis is on less tangible values such as quality, service, range of merchandise and store ambience. Tesco and Sainsbury both frequently advertise in the Sunday newspaper supplements with glossy photographs emphasising the above points but with no mention of price. Supermarkets now stock a much broader range of fresh foods, such as delicatessen, dairy products and fruit and vegetables, and the larger superstores offer services such as opticians, dry cleaners, and key-cutting.

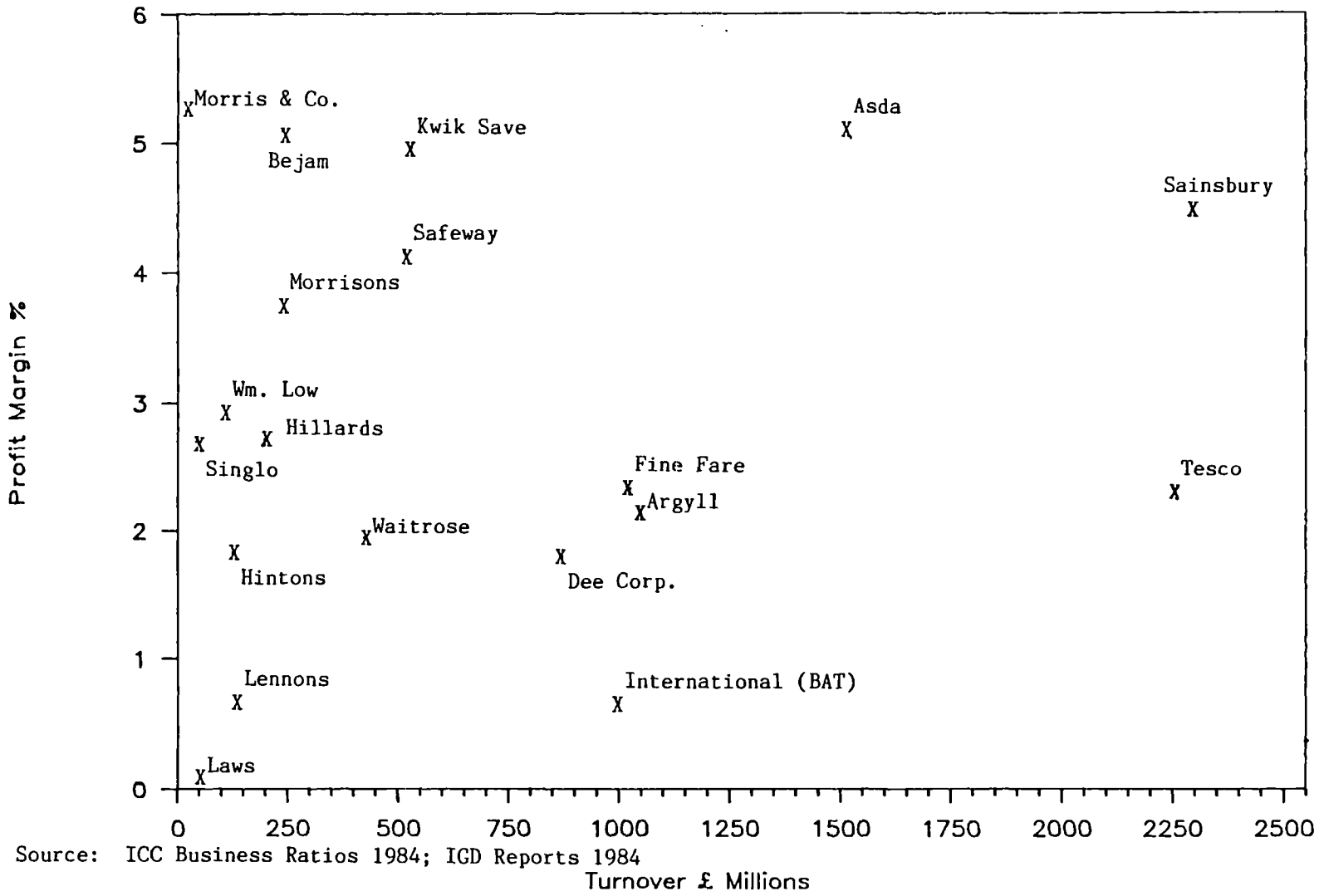
The net profit margin is the industry's main measure of success (Figure 2.5). In 1984 most of the major multiples were aiming for a five per cent margin, however, for those with over twenty-two billion pounds turnover, a three per cent margin still created sufficient capital to reinvest in new stores. Those companies with margins below two per cent and turnovers below £200 million faced obvious difficulties regarding long-term viability. The increased trend towards fresh foods provides a higher profit margin as does a greater emphasis on own label goods, which in 1987 accounted for approximately 32% of packaged grocery sales in major multiples. In Sainsbury, the market leader in this area, own label goods account for 56% of the total sales value, compared to Tesco's 35%, even Asda, who had previously not stocked own labels, preferring instead to offer the brand leader at a competitive price, announced their decision to develop a full own label range in 1985.

CENTRALISED CONTROL

Another way of improving margins is to become more efficient by improving distribution methods, greater productivity and tighter control through computerised management information systems. Increased centralisation is seen by many companies as a way of improving efficiency. Distribution is more centralised with a higher percentage of goods going through the companies' own warehouses rather than direct to stores, figures for 1987 showed that some multiples controlled over eighty per cent of branch deliveries (IGD Food Retailing). Buying is also becoming more centralised with few sales

Graph Showing the Relationship Between Turnover and Profit Margin

Figure 2.5



Source: ICC Business Ratios 1984; IGD Reports 1984

representatives now calling on individual stores to take orders, leading to greater central control of the lines stocked by the stores and improved buying terms. Above all, decision-making on most aspects of store operations is now centralised with store managers having very few discretionary powers.

Tesco is illustrative of this trend towards greater centralisation. The company operated on a decentralised basis until the early 1980's. Store managers were given extensive powers to be virtually their own entrepreneurs in the market place. Each local store manager had the autonomy to go out and negotiate his own deals with local suppliers and, within certain guidelines, sell at his own price. However, in an attempt to gain greater control over the business, Tesco reversed its previous policy and began to centralise its operations. Buying is now controlled from a central buying office and store managers can no longer negotiate their own deals. In addition, the company reviewed the range of goods that stores stocked and reduced this from a maximum of 15,000 lines to 7,500. By instituting greater control, Tesco was able to significantly improve store productivity performance through better stock control, shelf allocation and distribution systems.

The increased use of new technology has enabled the companies to pursue this policy of greater centralisation more effectively. It is not suggested that the introduction of new technology in any way compelled the companies to become centralised, which could be

interpreted as a form of 'technological determinism'. In general the senior management in these companies implemented a policy of centralisation that would give them increased control and ensure the branches throughout the country presented a consistent image in terms of range, merchandising and pricing. In view of this policy decision and the technical developments that were taking place, the management were able to utilise technology that would enable them to further pursue their chosen strategy. They could equally have opted for technology which would have enabled them to pursue a policy of decentralisation, either by processing the information in-store, where the stores are large enough, or by processing the information centrally and then transmitting it back to the store for decisions to be taken locally.

RETAIL TECHNOLOGY

The chapter has so far outlined the many changes that have taken place in the retail grocery trade over the last ten years. One change which has affected virtually all industries is the introduction of new technology and retailing has been no exception to this trend. Retailers have been using computers since the 1950s and indeed were among the first companies in this country to use large mainframes for central administrative functions like accounts, sales analysis and payroll. Pettigrew's (1973) work with a retail organization dates their first computer purchase back to 1956.

It is not necessary here to discuss the history or technicalities of computerisation as these have been well documented elsewhere. This section will refer to technology which has been specifically designed or adapted for use within the retail industry, this includes portable data capture units and electronic point of sale equipment.

Despite retailers early use of computing for head office functions, they lagged behind other industries during the 1970s and were unwilling to invest in computerising their stores until the mid 1980s. Nevertheless, it is this area which has received most attention in recent years and which will continue to do so.

PORTABLE DATA CAPTURE UNITS

Portable Data Capture Units (PDCs), also referred to as Data Entry Terminals, are defined as 'hand-held battery powered devices which are capable of recording data at its point of origin and of transmitting it, via private or public telecommunications links to a central point' (RMDP 1982). They were first used in Britain by Sainsburys in 1970, and whilst on this basis they could hardly be described as 'new' they have been modified significantly since this time and only became popular with the majority of supermarket chains about 10 years later. One change is that of size, when first introduced the PDC was as large as a supermarket trolley and had to wheeled around the store to collect data. They were then reduced to a size which could be carried by a shoulder strap and eventually to a hand-held terminal, similar to a large calculator.

Physical properties aside, PDCs have become increasingly more powerful and flexible over the past few years, with the advent of microprocessors, cheaper large capacity storage chips and improvements in two-way telcommunications facilities. Consequently, the range of applications of these terminals has expanded considerably, not only in retailing but also in other areas, such as forestry control, meter reading and salesman's order taking. Originally, data was recorded on ordinary cassette tapes, but this can now be done using micro-chips, customised to the individual organization's requirements.

Within retailing, and particularly grocery retailing, PDCs are widely used for re-ordering based on the measurement of stock holding and sales, frequently used in conjunction with the SLIM (Stock Labour Inventory Management) system. The operator takes the PDC around the store each day noting which lines need to be replenished, she then keys into the machine the appropriate product number and the number of cases required. The PDC is linked up to the telephone line and the data is automatically dialled-up by head office, transmission takes approximately three minutes. Goods are assembled in the central warehouse and delivered to the store the following day.

The advantages of PDCs are numerous. First, re-ordering can be done by assistants, quickly and accurately, with the minimum of training. Second, the twenty-four hour lead time reduces the number of out of stock lines. Third, goods are put immediately onto the shelves, thus

reducing handling costs and the amount of space required for stock-holding purposes. Fourth, since this information would be required in a computerised form for analysis by buyers, merchandisers and accountants, the data entry at branch level reduces the work-load at head office.

DATA CAPTURE AND PRODUCT MARKING

Before going on further, it is essential to discuss product marking, on which the systems often depend. Whilst it is possible to enter data manually into both the PDCs outlined above and the EPOS systems which will be discussed next, this method tends to be slow, prone to errors, and severely limits the amount of data that can be collected without slowing down the whole process. Therefore, in order to quickly capture data which is both accurate and complete it is necessary to devise a form of product numbering which uniquely identifies each product, and then to convert this into a form suitable for machine reading. There are four major product marking systems used by retailers throughout the world: kimball tags; optical character recognition; magnetic stripe and barcoding. Owing to its low cost and the relative ease of incorporating it into packaging, the barcoding method was chosen for the high volume grocery retailing business.

Barcodes were developed specifically for the retail trade, although their use has now extended to other areas such as libraries, building societies, manufacturing and warehousing. A barcode is simply the article (product)

number converted into a machine readable symbol. The symbol itself consists of a series of bars and spaces of varying width to a pre-determined standard and structure. It is read by a light pen or low intensity laser scanner linked to a computer which transfers it back to the original format.

Barcodes are now found on most grocery products and form part of the label design. In principle, the labelling of products with the barcodes and the subsequent reading by the laser scanner should be a fairly straightforward operation provided that the various technical parameters are adhered to. However, in reality, this caused a number of difficulties in the early days and was a continual source of irritation for supermarket chains, including the one in the case study. Some of the problems were technical, for example insufficient blank area around the barcode to distinguish it from the rest of the label, insufficient colour contrast between the bars and the spaces. However, most of the problems were logistical, for example placing the barcode near the edge of the packaging so that it wrapped around the corner or was covered by the seal, assigning the wrong code to a product or the same code to two products and changing the code without first notifying the retailers to enable them to update their files. Fortunately, as more supermarket chains are now using laser scanning, greater pressure has been exerted on manufacturers and many of the problems associated with barcodes have been overcome.

The international standards and the allocation of article numbers are controlled by the European Article Numbering (EAN) system, which, in January 1988, included 32 countries both within and outside Europe. The US, however, uses the Universal Product Code (UPC). The EAN system involves the allocation of a unique number consisting of thirteen digits. The first two digits identify the nationality of the issuing authority, in this country the number 50 is used to identify the UK Article Numbering Association (ANA). The following five digits identify the manufacturer/supplier and the next five identify the product. The final digit is a check digit to ensure that the code is correctly composed.

ELECTRONIC POINT OF SALE

Electronic point of sale (EPOS) basically involves the capture of information at the point of sale using sophisticated electronic cash registers, this information can then be processed locally or transmitted to a central location for processing and analysis. The use of EPOS, which escalated in the 1980s was brought about by the development of the micro-chip. This enabled cash registers to have extensive capabilities without the disadvantage of large size which would be unacceptable at the point of sale. As noted by the Distributive Trades EDC (1982),

> 'The main cause of change is the development of the microprocessor. It has meant that computers are not only smaller, cheaper, easier to use and capable of operating in shop and warehouse

environments, but are now available at economic cost for use in all types and size of business'.

Another development has been improved communications. This facilitates the transmission of data to a central location for processing and analysis, thus gaining economies of scale, and also the passing of information such as prices, in the opposite direction from head office to store. The Distributive Trades EDC (1982) noted that the availability, reliability and cost of communication facilities would be an important factor in determining whether retailers took full advantage of the opportunities in computer technology.

Each sector of the retail industry, for example department stores, variety stores, specialist stores and supermarkets, as well as restaurants, pubs and petrol stations have differing requirements concerning hardware configurations, and software. Many equipment manufacturers and software houses have developed systems to suit these varying needs. Even within each sector the requirements of each company vary depending on the size of the organization and individual stores, the money available for investment, the data processing policy and company strategy as a whole. Above all, the system chosen depends on the preferred choice of the organization's decision-makers, working within a number of constraints such as time, cost and size.

There are now a large number of companies in the market for EPOS systems coming from both traditional cash

register companies, for example NCR, Sweda, and computer manufacturers, for example ICL, IBM, DTS, each of which has a number of different models on offer. Table 2.5 lists 23 major suppliers with over 50 different systems suitable for a variety of applications. Additionally, the larger retail organizations, and increasingly the smaller ones too, are able to specify their requirements to the manufacturers and have equipment and software tailor-made or modified to their needs. Within the specific context of this research the systems which are of interest are those tailored for the supermarket trade.

LASER SCANNING SYSTEMS

Since the majority of grocery items are now barcoded, laser scanning is the most obvious choice of system for supermarkets. It has been suggested for some time that a minimum of eighty per cent of grocery sales by volume (as opposed to number of lines) would need to be barcoded at source in order for laser scanning to become a viable proposition. Once this level was passed in 1983, a number of companies began introducing laser scanning systems, these range from the large superstore with thirty checkout lanes to the small independent with three checkouts. Figure 2.6 shows that the number of grocers with laser scanning in the U.K. increased from 6 in 1981 to 473 in 1987.

From the customer's or checkout assistant's point of view the laser scanning operation is simple: the item with the

Table 2.5

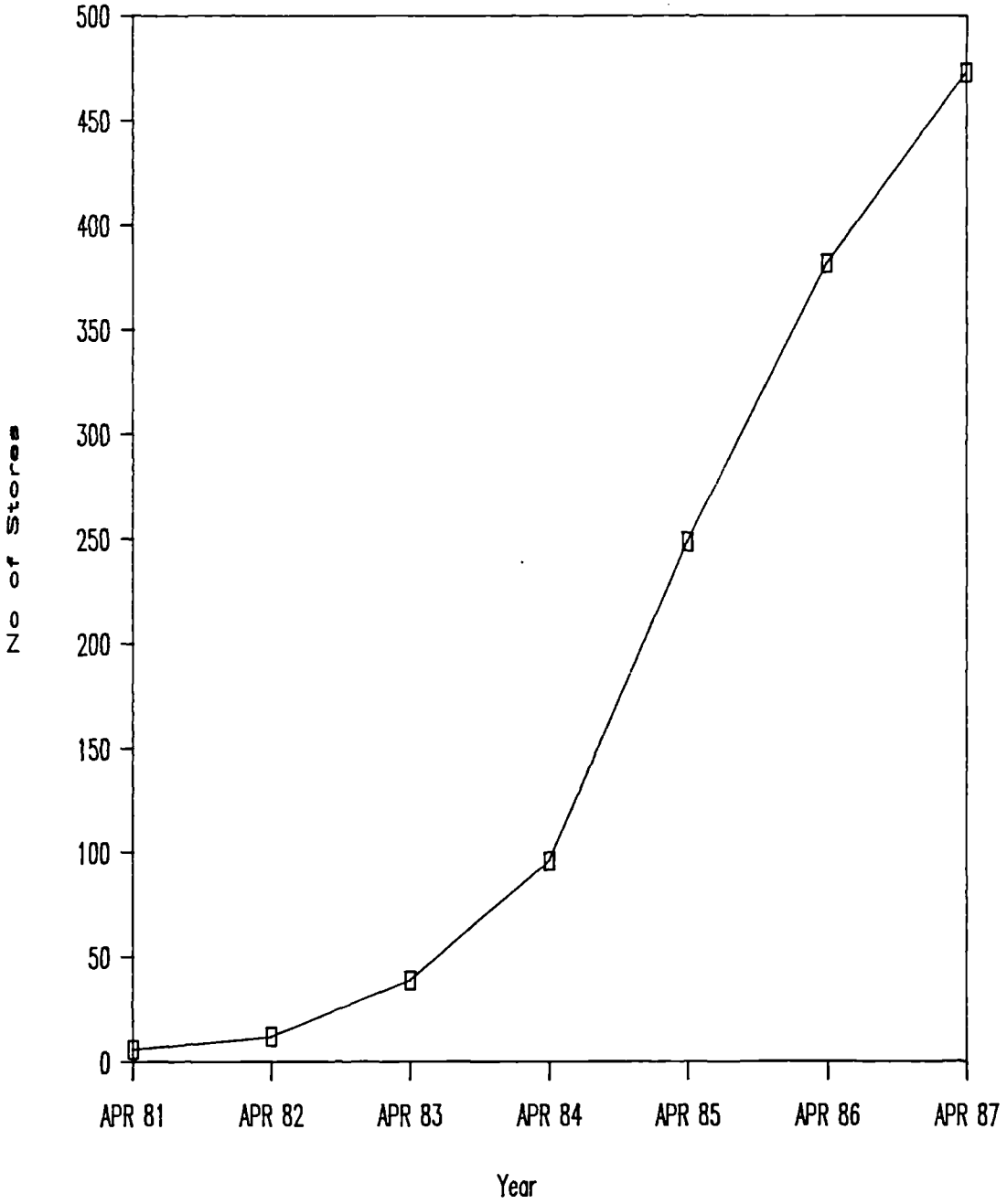
EPOS Systems: Suitability to Types of Retail Outlet

Retail Organisation Type / Supplier Model	General Merchandise									
				Multiples				Single Store	
				Cashpoints per Branch				Cashpoints per Branch	
	Dept. Store	Variety Store	Super-Store	Over 6	Under 6	Under 3	1	More than 1	1
ADS		45/42		45/42			45		45
DTS		Honeywell Wang/520			◆——	——	520		——◆
Gallid				◆—— DEC/Gallid Terminal ——◆					
Hugin		7250			◆——	——	7250		——◆
IBM	3651/3683		3651/3683	◆——	——	3684/3683	——		——◆
					◆——	——	5260		——◆
ICL	9560/9512 9507/9505	9535/9512 9507/9505	9560/9512 9507/9505			◆—	9526/9512 9507/9505 —◆		
MCS					◆——	——	MicroSell 8000		——◆
NCR	Various Controllers 2950 2153 2152	Various Controllers 2950 2153 2152	Various Controllers 2950 2153 2152	◆——	——	2153/2152	——		——◆
				◆——	——	†2950/2152	——	2152	——◆
Nixdorf	8862/8810 (35)	8862/8810 (15)	8862/8810 (35)		◆——	——	8810	——	——◆
Nokia		3/18 3/38 CRS2000		3/18 3/38 CRS2000		Mikko/ CRS2000			
Norfrond							System 81 System 99		System 81 System 99
Omron					◆——	——	System 80	——	
Philips	◆——	PTS6911/6281	——◆						
Prodata					◆——	——	C75 C72	C70 ——	C70 ——◆
QSI		6209/6200					5000		5000
						◆—	6200;5500	——	——◆
RTC		3060/300 Series	4060/300 Series				360; 350		360; 350
Riva		Hewlett Packard/ Custom Till		◆——	——	Custom Till	——	——◆	
Sharp					◆——	——	H1700	——	——◆
Software Sciences		3052/3022		◆—— 3052/3022 ——◆		◆—	30/22 30/03	——	——◆
Sweda	◆—System 40/L75-10—◆			◆——	——	L75-10	——		——◆
					◆——	——	L50	——	——◆
Systime	——	——	——	See Text	——	——	——	——	——
TEC		TS80/M2200 -20			◆——	——	M2200-20	——	
UCSL					◆——	——	ISC2000	——	——◆

†Not yet available

Source: RMDP (1982)

Scanning Installations in Grocers Figure 2.6



Source: Nielsen Grocery Trade Report 1987

barcode is passed over the low-powered laser scanner which automatically looks up the price of the article in the system's memory file and transmits it back to the checkout display. The whole operation takes only a fraction of a second. In addition, details of the transaction, such as the product description, method of payment, time and checkout assistant, are recorded on file.

There is a large number of laser scanning systems currently available which vary widely in terms of: design philosophy and available configurations; performance and systems capabilities; types of memory; price look up capabilities and data communications facilities. Scanning systems can be divided into three broad groups: big store controller-driven systems; micro-computer controlled systems and terminal-based systems.

Store Controller-Driven Systems. Store controller-driven systems provide facilities not only for scanning but also for extensive local and central management information. The basic configuration involves EPOS terminals and scanners linked to twin mini-computers (one for back-up) in the store's office. Attached to this may be a series of peripherals, such as VDUs, management terminals, printers and shelf-edge label printers. Owing to the cost of the twin mini-computers such systems carry large overheads and are therefore expensive per lane, except in very large installations. They are not viable below about eight lanes and ideally should support sixteen to twenty lanes. The powerful mini-computers provide facilities for

quite comprehensive local data processing, but the company may also choose to link the store to some central point for further analysis of data, particularly if the systems are extended to an increasing number of branches.

Micro-Computer Controlled Systems. In principle, micro-computer controlled systems are the same as store controller-driven driven systems. The difference is that a less powerful, and therefore cheaper, micro-computer is used to provide data processing at the centre of the system. Consequently, systems are relatively cheaper on a cost per lane basis in smaller installations. As local data processing facilities are limited, it may be necessary, where the store forms part of a chain, to transfer data to head office for processing. This may be done via telecommunications lines or by physically transferring data on cassette or diskette to head office via post or courier.

Terminal-Based Systems. The simplest configuration is the terminal-based system which consists of a small number of basic laser scanning terminals called 'slaves' linked to a 'master' terminal which contains the operating files, price-look-up files and transaction data files. Such systems have limited data processing facilities. Local reporting is achieved by printing reports on the receipt printer of the master terminal, the width of which limits the scale and scope of the reports available. However, the system can be enhanced by linking the terminals, via the master, to a micro-processor in the store's office. Additionally, data may be transmitted to head office for

processing as with the micro-computer controlled systems above.

COSTS AND BENEFITS OF LASER SCANNING

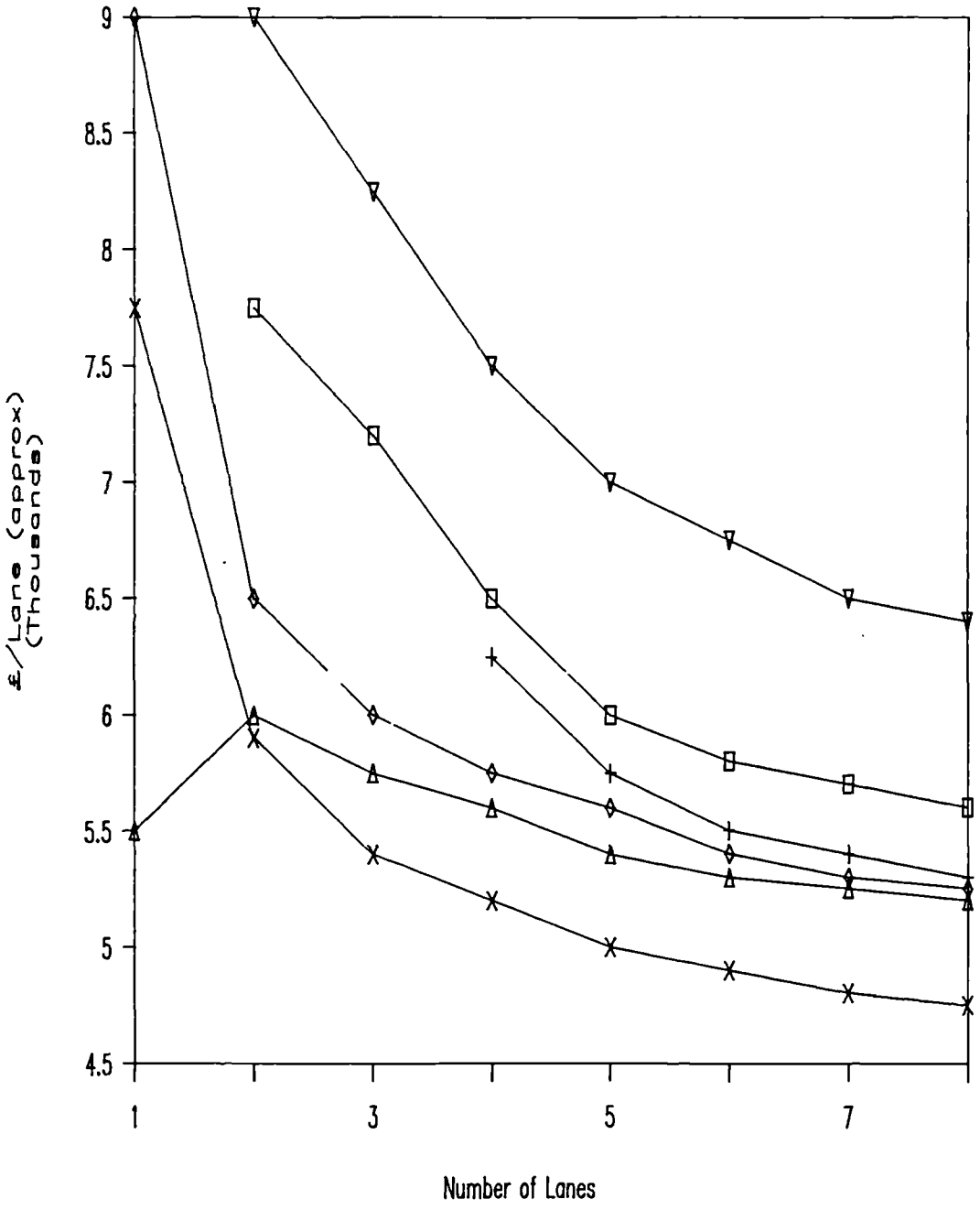
Having discussed the various options available to grocery retailers, what are the costs of the laser scanning systems and what benefits can be expected to offset these costs? The cost of laser scanning varies enormously depending on the type of system required, its capabilities and the number of lanes installed. As can be seen from Figure 2.7, the simplest terminal-based system could be obtained for less than £5500 per lane for three lanes in 1982, with the price per lane decreasing as the number of checkouts increases. The more sophisticated systems with in-house data processing facilities began at about £7500 per lane for 8 lanes, decreasing to £6500 per lane for 24 lanes (Figure 2.8).

There are numerous potential benefits claimed by equipment manufacturers and industry observers. However, as yet most of these have not been supported by quantifiable, detailed and accurate data, either from a company who has experienced laser scanning in the UK, or from extensive independent research on the topic. This lack of empirical data helps to explain retailers reluctance to invest heavily in the computerisation of their stores.

Potential benefits are divided by most writers into 'hard' and 'soft'. The hard benefits are those which can be measured and assessed quantitatively, whereas the soft are

Cost of Scanning Systems: Figure 2.7

Micro Driven and Terminal Based



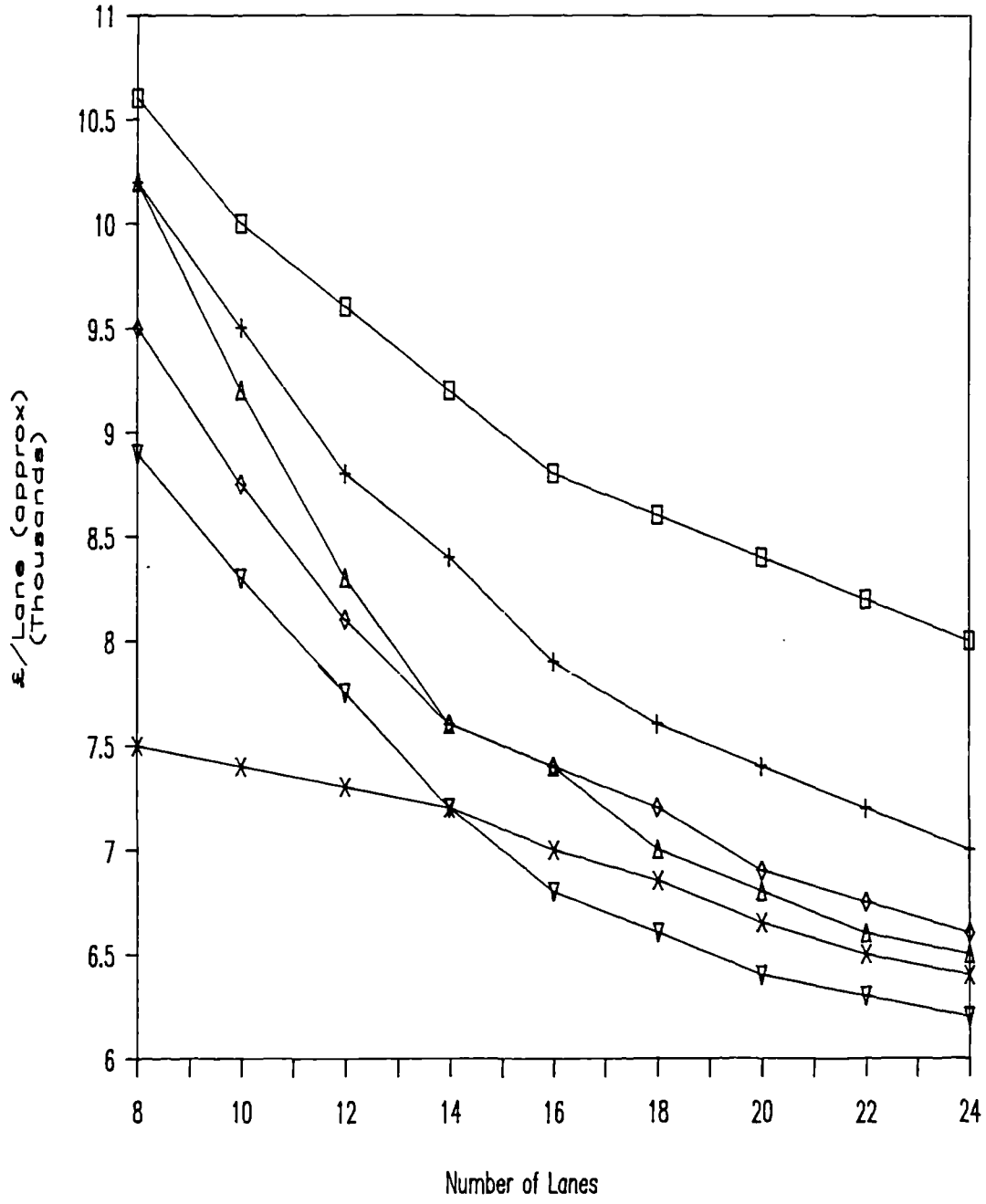
□ IBM 3684/3683 + ADS 45/42 △ DTS 540

◇ Sweda L55 ▽ RTC ╳ Omron 80C

Source: RMDP 1982

Cost of Scanning Systems:
In-Store Controller Driven

Figure 2.8



□ IBM 3650/3680 + Datachecker Δ NCR 1255

◇ RTC 4060 ▽ Sweda L75-25/905 ×Nixdorf 8812/60

Source: RMDP 1982

rather less tangible and are deduced as much by guesswork as by judgement (Jones 1984). A major hard benefit is improved checkout productivity achieved through faster item transactions. It is claimed that the number of items passing through the checkout will increase from approximately twenty-two to over thirty and possibly forty items per minute. Thus giving cost savings through a reduction in the number of checkouts and checkout personnel, plus space savings at the front end.

This claim, however, is disputed by some observers. The results of an international study showed 'no overall speeding up of checkout operation' (Infratest 1984). In one extreme case cited traditional cash registration resulted in up to 20% greater efficiency than scanning checkouts. Factors which affect the realisation of potential benefits in checkout flow include the slope of the operator's learning curve and the problems with barcodes noted previously, both of which were found to be significant in Laws Stores.

Another hard benefit arises from item price removal. As prices are held on file it is no longer necessary to price each item individually, thus saving time in pricing (estimated by Laws Stores to be 48 seconds per case) and also the cost of pricing guns and tickets. Further hard benefits accrue, at least in principle, through more accurate pricing. As the correct price is held on file it eliminates the opportunity for the operator to guess a price where the ticket is missing or to ring up the wrong

price (accidentally or otherwise). In this way it also reduces 'shrinkage' which occurs through theft and under-ringing. Hard savings are also made through quicker and more accurate cash reconciliation and easier cashier training.

Potential soft benefits come mainly from utilising the sales data which is generated. This can lead to improved labour scheduling both at the front-end (checkouts) and in other departments, more effective shelf-space allocation and a reduction in the number of out-of-stocks. If goods are also scanned on receipt at the back door it can eventually lead to automatic re-ordering requiring only limited intervention by management.

In addition, further 'very soft' benefits can be identified which are even more difficult quantify. In particular, the detailed sales data enables an improved sales mix, tracking of items and additional promotional techniques. Less tangible benefits include improved store image and more detailed customer receipts. Despite being more difficult to quantify and possibly less easily attainable, the soft benefits may ultimately give greater returns. Equipment suppliers, NCR, claim that a typical store of 15,000 to 20,000 sq ft with twelve traditional checkouts and a turnover of £4 million a year, would gain total hard savings equal to 1.05% of turnover compared to assessable soft benefits amounting to 1.49%.

SUMMARY

This chapter has shown the retail grocery trades to be undergoing significant changes, including increased competition and concentration in the hands of a few large supermarket chains. As a result of these changes, the smaller regional multiples, such as Laws Stores, are under considerable pressure. One of the major changes that has taken place is in the field of new technology, in particular EPOS, with a wide range of both suppliers and systems for retailers to choose from.

The environment in which Laws operated was complex and uncertain. The role of the company within this context was a relatively insignificant one. In view of its small size and lack of resources, Laws was unable to substantially alter this environment. Nevertheless, it was able to exercise choice over the direction taken and the technology which it used. The way in which Laws responded to the environment and the choices it made concerning technology will be discussed later in the thesis. In order to put this into context, the next chapter explores, at a more general level, the characteristic features of supermarket chains and the ways in which they have evolved.

3. ORGANIZATION OF A SUPERMARKET CHAIN

The second chapter illustrated the environment of grocery retailing and detailed recent changes. Before moving on to the specifics of how Laws Stores operated in that environment, this chapter investigates at a more general level the characteristic features of supermarket chains. It aims to show the principles on which such companies base their organization and the way in which they operate. It also includes a discussion of the information required to run the operation and the sources of such information.

THE EVOLUTION OF GROCERY CHAINS

In order to understand how supermarket chains are currently organized and operated it is necessary to look at their historical development and evolution. Most of the chains that are now well known in Britain began as single grocery stores in the late eighteenth or early nineteenth century (Table 3.1). There are, of course, notable exceptions such as the co-operative societies and Asda. However, the majority were family businesses, managed and operated by the owner and his family who often lived above the shop.

These businesses expanded by opening additional branches close by which were managed, wherever possible, by a member of the family. As the number of branches grew, this became increasingly difficult and professional managers

The Origins of Supermarket Chains Table 3.1

Current Name	Founder	Place	Date
Galbraith	William Galbraith	Paisley	1894
Gateway	J. H. Mills	Bristol	1880
Grandways	William Jackson	Hull	1851
Laws Stores	Arthur McClelland	Newcastle	1907
Wm Low	James Low	Dundee	1868
Morrisons	William Morrison	Bradford	1899
Presto	Thomas Lipton	Glasgow	1871
J. Sainsbury	J. Sainsbury	London	1869
Tesco	J. Cohen	London	1919

Source : Company Documents

were recruited. The supermarket chains soon recognised that advantages could be gained by buying their goods from a central point. First, there were economies of scale as lower rates could be negotiated by ordering in larger quantites. Second, specialists could be employed for the sole purpose of buying goods and negotiating contracts. Unlike single store owner-managers, who had to manage the store and staff as well as negotiate contracts, these experts could devote all their time and energy to the buying function. Third, the best sources of supply for particular lines could be identified and control exercised over the grade and quality of goods supplied. Fourth, centralised buying reduced administration overheads, paperwork was reduced by replacing the several small orders and numerous invoices with one large order and invoice. Fifth, by centralising this major function greater control could be excerised by family members.

The grocery chains continued with this organic growth and expanded rapidly. For example: J Sainsbury was founded in 1869 and by 1914 had 115 stores; Lipton's of Glasgow opened 100 shops in twenty years following their first store in 1871; Home and Colonial, beginning with their first store in 1885, had opened 400 by 1900 (Görbing-King 1972). With such rapid expansion, the necessary expertise could not be found within the owning family and therefore, in addition to the buyers, other specialists had to be recruited to cover such areas as accounts, personnel and advertising. The branches were too small for each one to support such expertise independently so these specialists were located at head office with the buyers. Although

operating a large number of branches, strict control was retained by the owning family through standardising procedures across the whole company and by centralising decision-making powers at head office.

This brief overview of the evolution of grocery chains has highlighted several features which many of them still retain as modern supermarket companies. In particular this includes: family ownership and control; specialisation of functions and centralised decision-making linked with a high degree of standardisation and formalisation. It is not suggested that these features exist merely as historical accidents, although that may be true in some cases. Rather, it is argued that they developed in response to the nature of the business as the most efficient means of organizing the chains. Whilst there have been changes in the nature of grocery retailing, many of which were highlighted in the previous chapter, the basic principles on which the businesses operate remain the same. As the features specified above, family ownership, centralisation and specialisation, recur throughout the thesis, each will now be covered in more detail.

FAMILY OWNERSHIP AND CONTROL

The importance of family firms in retailing has been noted by Channon (1978). In a study of the largest 100 service companies he found that many of them were still led by a founding entrepreneur and a substantial number were managed at senior levels by descendents of the founder.

This was particularly true of retailing as described in Channon's chapter entitled 'Families and Formulas for Retail Distribution', and can be seen in grocery chains by the number of family members still on the board, very often still acting as executive directors. Sainsbury's is probably one of the most notable with grandsons of the founder as Chairman and Finance Director; Tesco also had a family Chairman until 1985. Many of the regional multiples are still owned and managed by descendents of the founder. The two case study companies, Laws Stores and Wm Low were examples of this, others include Morrisons, Jacksons and, before they were taken over by Argyll, Hintons.

There are a number of implications for firms which are both owned and managed by family members. One of the major drawbacks are the limits on capital. Loans from financial institutions are costly and may not be available, whilst recourse to other methods of financing may mean relinquishing shareholding to outside the family group. These limits on funds are particularly crucial when a company may wish to invest heavily in new technology. However, where funds are available, family firms may be able and willing to take greater risks than would normally be acceptable to shareholders and consequently the pay-off may also be higher.

Levinson (1971) noted one of the problems of family firms as being rivalry between family members. Perhaps two sons, cousins or grandsons fighting to gain control of the company when their predecessor leaves. Conversely, there

may be difficulties if there are not enough family members to fill all the positions of responsibility in the firm. For example, data processing is a highly specialised function and it is unlikely that such expertise will be found within the family. Thus, the owning family find themselves in the unwelcome position of being dependent on an outside specialist for what has become a vital part of their operations.

In addition, a family firm may find it difficult to recruit and retain highly qualified senior executives. Sofer (1961) notes, 'the problem of recruiting inadequate middle management was inseperable from the practice of reserving senior appointments and directorships for family members'. Promotion to director level and a high salary may not be sufficient reward if an ambitious man really wants to exercise power. He is unlikely to be able to do this in a family firm and so becomes frustrated and moves on after a short while.

A further problem of family firms relates to the decision-making processes. Barry (1976) notes that these 'will frequently result in decisions which will not always appear wholly rational when seen from the perspective of the business organization alone'. Such irrationality arises largely from the role ambiguity felt by owner-managers who occupy three roles simultaneously: as family members they are responsible for the family's investment; as directors they are concerned with the future of the business and as managers they have departmental interests.

Such irrationality in decision-making could have disastrous results for the firm where large investments in new technology are concerned. As Donnelly (1964) points out: it 'may lead to management unwillingness to take necessary corrective action when company accounting procedures indicate that its pet projects are out of line'. The question arises as to whether a family member should support the introduction of new technology which requires a large injection of capital and would not be in the long-term interest of the company, but would further his own departmental interests.

Miller and Rice (1967) describe the problems faced by the individuals and the organization in family firms as being attributable to the natural coincidence of task and sentient boundaries. The task group is that which comprises the individuals employed in the activity system and the sentient group is the one to which individuals are prepared to commit themselves for support. For a family member working in a family firm these two groups naturally coincide and whilst this may be effective in conditions of stable equilibrium, at times of expansion or change, for example when introducing new technology, it can lead to distorted judgement and the disruption of relationships within the firm.

One of the strengths of a family firm is having a 'dedicated and loyal internal organisation' (Donnelly 1964). Thus whilst the company may have difficulty in recruiting and retaining management, those that do stay often demonstrate considerable loyalty. Such commitment

can be of cruicial benefit to an organization undergoing drastic and often painful changes brought about by the introduction of new technology.

CENTRALISATION AND DECENTRALISATION

As Child (1977) notes, centralisation and decentralisation are not simple dichotomies, there is a considerable choice of possibilities in between. Varying types of decisions may be passed down to varying levels in the hierarchy. Both centralisation and decentralisation have advantages for supermarket chains and the debate surrounding this issue has gone on for many years. The principle arguments in favour of both are summarised below.

Centralisation

(a) Centralisation can economise on managerial overheads as it avoids the duplication of activities or resources that would occur if similar activities are carried out independently by each branch or region. The degree to which certain activities are decentralised depends to a large extent on the size of the branch and the need for that particular specialism at branch level. For example J Sainsbury have a Personnel Officer in each branch, either on a full or part-time basis depending on the size of store. This is thought to be necessary by the company because wages form a major part of their costs and staff are therefore considered an important resource. In addition, it removes some of the administrative burden associated with personnel policies from the branch

manager. It would not be necessary for other specialists, such as accountants, to be employed in each branch as there would be insufficient work to justify this.

(b) A further benefit is that centralisation of management enables the company to employ a wider range of specialist functions than would otherwise be feasible. This includes such things as corporate planning, market research and merchandising. Furthermore, it enables the companies to recruit better qualified and more able staff by paying higher wages and offering better prospects than would be possible in smaller units. The cost of providing such staff at the individual store level could in itself be prohibitive.

(c) It is argued (Child 1977) that top managers have generally proven their ability by the time they reach senior positions and normally have more experience than other employees. Therefore, their capabilities are fully utilised in a centralised organization as they possess the authority to make decisions which are subsequently implemented throughout the organization.

(d) By focusing power and authority in a small number of executives, centralised control enables them to respond quickly to changing market conditions, for example consumer demand for healthier foods and price cutting strategies of competitors.

(e) Probably the most potent argument for centralisation in grocery chains is the economies of scale that can be

gained by bulk buying. As Davies et al (1985) note, 'the size of the large retail chains has enabled them to obtain highly competitive terms from food manufacturers and other suppliers'. Such terms are not available to independent operators and it is unlikely the suppliers would be so generous with the multiples if each branch manager ordered whatever stock he chose and negotiated his own deals.

This issue of 'discriminatory discounts' is one which has aroused considerable concern in the UK. First, it was felt that manufacturers granted discounts to large retailers greater than was justified by the cost saving. Second, there there was concern that this benefit was not being passed on to the consumer. On the first point the Monopolies and Mergers Commission (1982) found the evidence to be confused, as it is difficult to calculate cost on the basis of individual orders. On the second point it concluded that the general practice of 'discriminatory discounts' had not been harmful to the public, in fact they had been provided with lower prices than they would have in its absence.

(f) Advantages can also be gained from centralising warehousing facilities. Rather than having several suppliers' vehicles calling directly on individual stores, many companies now distribute a high percentage of their goods from a small number of regional warehouses, which they either operate themselves or contract out. Consequently, each branch receives only one or two large deliveries each day (or each week, depending on the size

of store), thus reducing the long queue of vehicles waiting to be unloaded and improving efficiency.

In addition there are further benefits with this system as it is possible to reduce the amount of stock held in stores leading to subsequent savings of cost and space. This is particularly important in high street stores where rent and rates are high, the space that is saved can be put to more productive use as selling space. Centralised warehousing facilities enables the stock to be held in low cost locations such as industrial estates.

(g) Centralised decision-making enables management to impose standards across the whole company. Thus, all branches present a consistent image in terms of the range of goods stocked, advertising and promotions and store layout. Through standardising and formalising operating procedures, for example ordering, merchandising and staff recruitment, the company is able to maintain strict control and identify those branches which may not be performing satisfactorily. From their position in the organization, senior managers have a broad company-wide perspective of what is going on and how far this conforms to policies which have been agreed and established. They are, therefore, in a better position to make decisions which will accord with those policies and be consistent with the interests of the entire organization.

Whilst the above factors would seem to put forward a good case for centralisation, there are also several advantages in decentralisation.

Decentralisation

(a) Decentralised decision making prevents senior managers becoming over-burdened with routine operational decisions. Instead, they devote more of their time to long-term policy matters.

(b) There are motivational considerations in favour of decentralisation. It is argued that most people are willing to give more to their jobs when they have a high degree of individual freedom, discretion and control over their work. Motivational problems can be particularly acute in retailing because individual units are at a distance from one another and from head office, therefore it may be difficult for management and staff to identify with any 'common goals'. To overcome these problems branch managers may be allowed to operate their stores as autonomous units, almost as independent traders, with full responsibility and accountability for their own actions.

(c) Following on from the above point, decentralisation can often result in more effective controls and performance measures. This is because each branch can easily be identified as a separate sphere of responsibility and costs and revenues allocated accordingly. Control systems can be applied to these units in order to provide more feedback to higher management and better appraisal of management's performance.

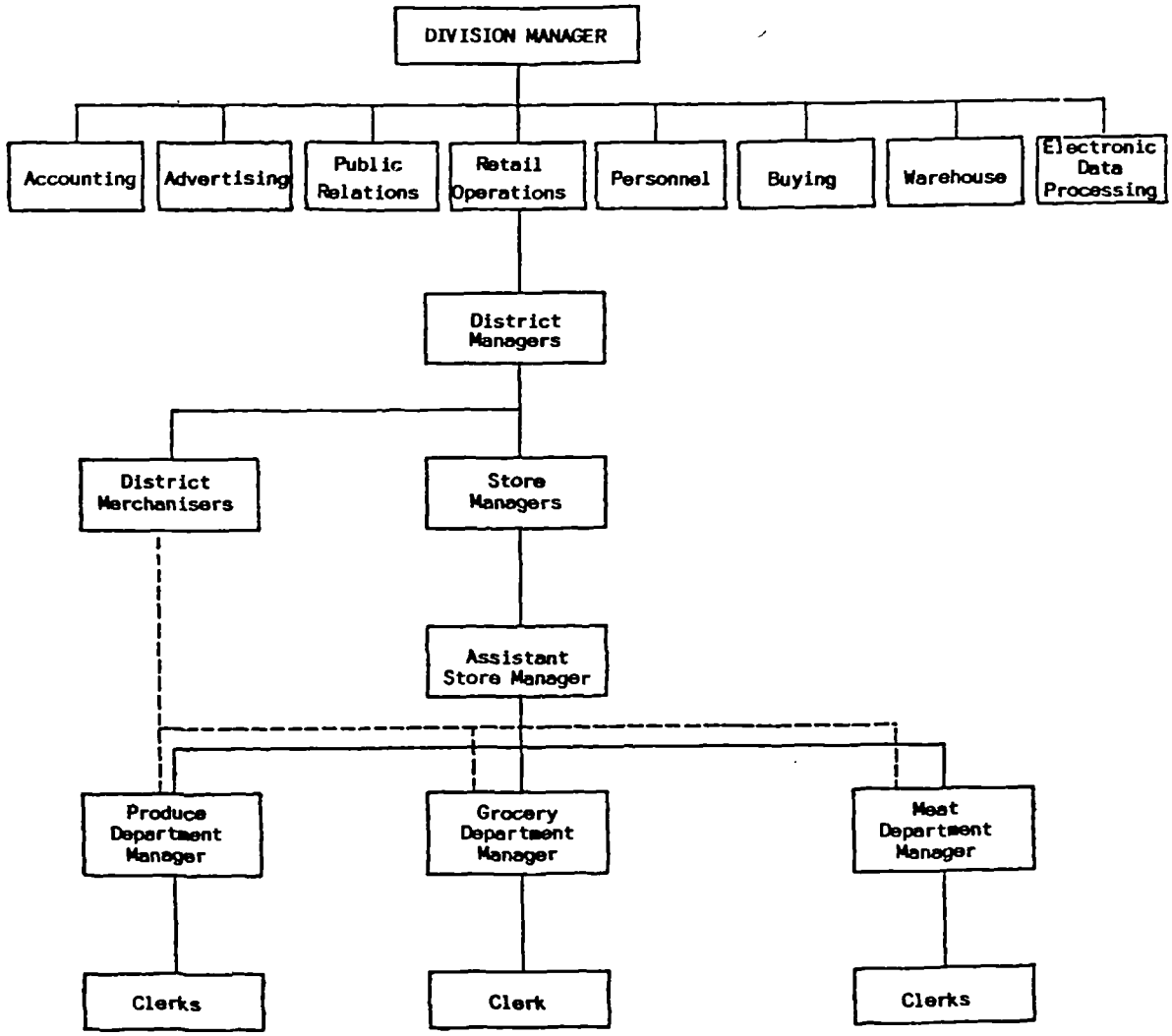
(d) Whilst it was argued that centralisation can lead to a quicker response to market conditions, decentralisation can lead to greater flexibility in relation to local conditions. The manager at the local level is much more likely to be aware of such things as regional food preferences or the opening of a new supermarket in his area. In addition, if he has greater decision-making powers he is able to respond more quickly to such changes than if the problem has to be passed up the hierarchy for a decision.

APPLICATIONS OF CENTRALISATION AND DECENTRALISATION

Varying degrees of centralisation and decentralisation have been used by supermarket chains over the years. Dalrymple and Thompson (1969) noted that Safeway in the United States operated with a relatively decentralised structure, but as can be seen from Figure 3.1 there is relatively little major decision-making below divisional level. If the company were truly decentralised, the store managers would have more authority and there would be no need for district managers.

The French hypermarket group, Carrefour, adopted a policy of decentralisation in the 1960s (Knee and Walters 1985). Branch managers were able to compose their own range of merchandise and sell them as they wished, operating within broad company guidelines concerning image, price appeal and working conditions. During the period of fastest expansion Carrefour's central administration numbered only nine people. In return for allowing managers to use

Organizational Structure Of A Retail Division, Safeway Stores Inc. Figure 3.1



Source : Dalrymple and Thompson, 1969

initiative and local buying policies, the company bore the consequence of losing substantial discounts on bulk buying, estimated at one per cent of sales. In addition, extra expense was incurred in training and paying high-calibre local executives. As noted in the previous chapter, Tesco also had a decentralised operation until the early 1980's when it reversed its previous policy and instituted greater central control.

Norkett (1985) argues in favour of strong centralised control and presents the financial results of the UK's 20 largest supermarket chains to support his view. In particular he notes that supermarket chains have developed sophisticated control systems for margins, stock levels, cash flow and good lines of communication, which he regards as the 'the keys to financial success'.

Norkett proposes that strict control is necessary over two areas: gross margins and store performance. In the case of the former it is necessary to achieve a balance between an adequate mark-up and a price in line with competitors whilst still achieving a fast stock turnover. To ensure that gross margins are sufficient to provide an appropriate return, monitoring systems are required on the relative efficiency of buyers.

In the case of store performance, Norkett advocates a management information system based on the principles of exception reporting. He suggests that such a system should highlight stores which are not reaching the required level of performance in five areas: lower sales

than the previous year; a fall in store gross profit; above normal stock losses; a high wages-to-sales ratio and below average sales per employee/hour.

Most, if not all, supermarket chains in the UK now appear to favour centralisation. This is because many of the advantages of decentralisation are not as pertinent in the UK as they are in other countries, such as the US and France. For example, the UK is a relatively small country, therefore the problems of distance from head office are less acute than elsewhere. Similarly, although there are variations in food preferences from one region to another, these are not so great as in other countries.

SPECIALISATION

Having ascertained that supermarket chains operate with centralised control this next section aims to investigate how the different central functions relate to one another and to the branches. In order to do this we need to study the main functions of a supermarket chain. Expressed simply: the independent trader buys in goods from the wholesaler, breaks these down into appropriate units for the consumer and sells them at a price which is both acceptable to the customer and provides the trader with an adequate return on his capital and labour. Thus, the operation can be immediately divided into two areas: buying and selling.

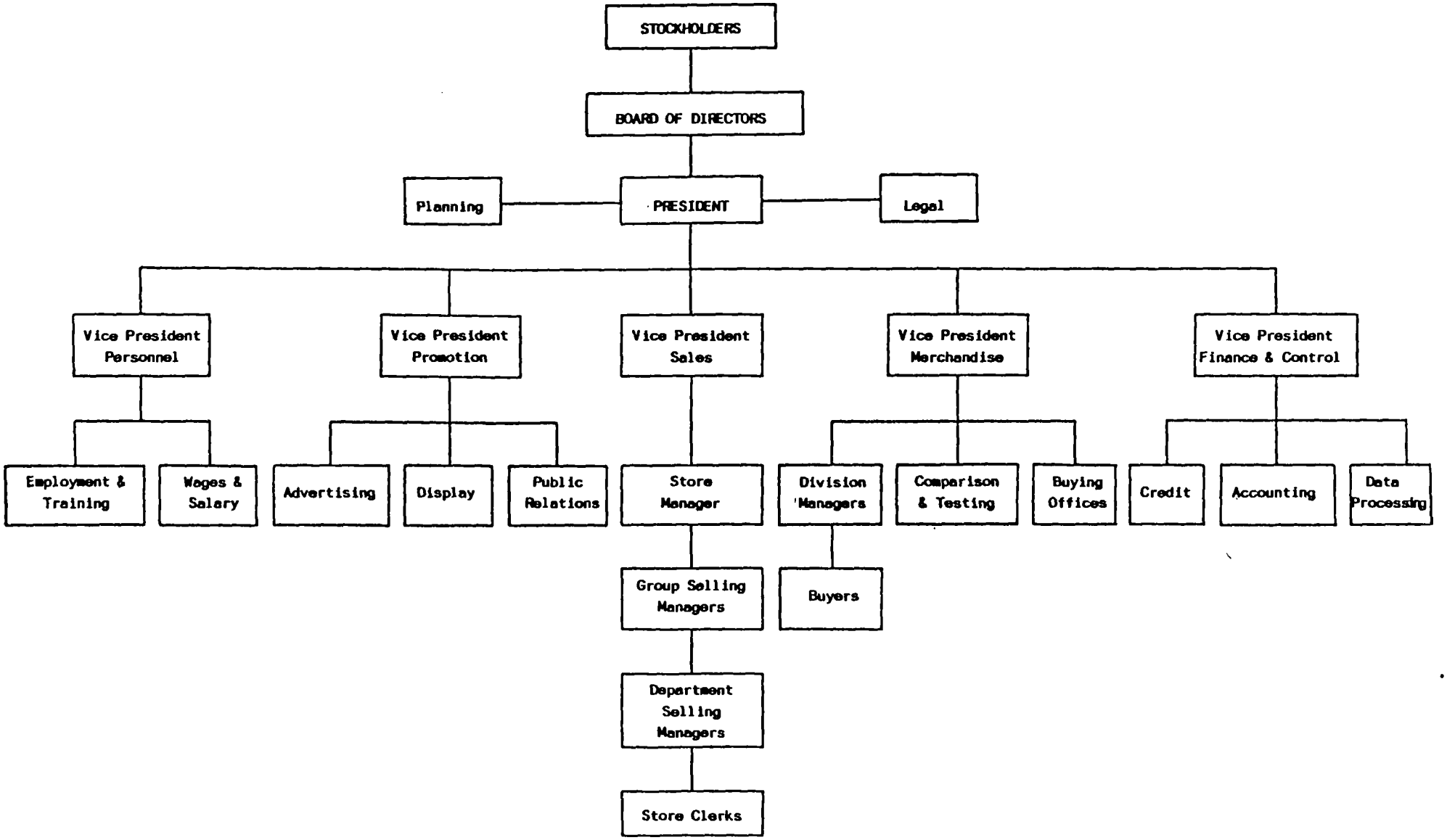
The separation of buying and selling into two separate functions, each with its own manager responsible for expenses and profits, was the basis of the 'Mazur Plan' (Figure 3.2). Developed by Paul Mazur in 1932, the 'Mazur Plan' became popular with U.S. department stores in the 1930's. However, opponents argued that separating buying from selling caused arguments regarding which one of those two functions was the dominant cause for a success in merchandising or, conversely, which was the dominant cause for a particular failure (Gist 1968). As Wingate and Freidlander (1978) observed

> 'separating buying and selling provides an ideal mileu for "buck-passing". If separate executives are charged with the responsibilities one for buying and one for selling, each is likely to blame the other for failures in the functioning of the integrated whole'.

Whilst such arguments were orignially based on evidence from department stores, many parallels can be drawn with supermarket chains. In this case buying is the responsibility of a specialist based at head office, whilst selling is the responsibility of branch managers in dispersed locations, collectively known as 'Operations'. This situation frequently leads to 'buck-passing' and counter accusations as noted above. For example, branch managers may accuse buyers of being too distant from consumers and unaware of their needs, listing products that are unsuitable and not catering to local tastes. In response, buyers may accuse managers of having a narrow viewpoint and not seeing the business from a company-wide

Figure 3.2

The Mazur Plan



Source : Dalrymple and Thompson, 1969

perspective. They claim that low sales figures are due to inefficient ordering systems and poor merchandising.

As supermarket chains have grown they have added further functional departments in addition to buying and operations. Finance and accounting departments are required to manage budgets, cash flow and forecast sales, as well as process invoices and pay creditors. A personnel department is also needed to service the high number of employees in a retail organization. As the chain becomes larger and more sophisticated it is often necessary to establish a marketing department, to cover such areas as pricing strategy, advertising and promotion, store layouts and merchandising policies. Additional functional departments may cover such areas as management services, property and development. One of the more recent departments to be added to retail chains and possibly one of the fastest growing functions is data processing or computer services. The responsibilities of such a department include maintaining and developing all the computer facilities in the company, for example head office administrative systems, warehouse stock control and, more recently, in-store systems.

This type of functional organization offers a number of advantages, in particular simplicity, efficiency and economy. It is economic in managerial manpower because co-ordination is achieved through top management, rather than several divisional managers or integrating personnel such as product managers. Individuals have clearly defined roles and responsibilities within their functional

domain and the reporting structure is also clearly defined with all information flowing vertically through the hierarchy. These factors combine to make a functional structure particularly suited to stable conditions where its well-established roles and reporting procedures enable it to operate most efficiently.

By grouping together specialists such as research and development and computer services, further benefits can be gained through the sharing of equipment and facilities, for example laboratories and computers. This also ensures that the specialists are fully utilised across the whole organization rather than a particular specialist, for example a systems analyst assigned to one department being under-worked whilst in another department one may be over-worked. Grouping of specialists enables them to co-ordinate their work, exchange ideas and benefit from one another's expertise. Furthermore, such staff often gain additional satisfaction from working with others in their field. A functional structure also provides clearly marked career paths for specialists and so makes it easier to hire and retain their services.

There are disadvantages associated with a functional structure. A major problem is that top executives may become overloaded with co-ordinating activities and day to day operations. As a result there is little attention to strategic issues, such as major changes in the market and consumer trends. This 'executive overload' may partly explain the neglect of strategic issues within retailing companies particularly grocery chains, which has been

noted by several writers (Knee and Walters 1985, Davies, Gilligan and Sutton 1985). The issue of strategy and structure is central to this thesis and will be discussed in later chapters.

Highly functional structures tend to lead to problems of poor lateral relations. As co-ordination occurs through the hierarchy there are no mechanisms, as indeed there is no need for, horizontal communication between departments. Operating with its own group of specialists performing a specific task, each department is highly differentiated from the rest of the organization. In their definition of differentiation, Lawrence and Lorsch (1967) include not only differences in the tasks performed but also differences in the 'cognitive and emotional orientation among managers in different functional departments'. Such differences were found to be significant during the introduction of new technology into the case study companies and will be investigated later in the thesis. In this section the reasons why such differences occur will be discussed on a more general level.

One reason for differentiation is that individuals are recruited for departments according to their ability to perform the function required. These people will probably have developed an identification with the norms and criteria of their occupational group. As they pursue a career in that specialism by moving between several organizations their loyalty may lie more towards their profession rather than the company. This was a feature noted by Pettigrew (1973) relating to the pioneering work

of computer analysts and programmers in a retail organization of the 1960s.

A further reason for differences to occur is that each department within an organization has different ways of working, different critical issues, time horizons, performance measures and contacts outside the organization (Table 3.2). For example, the property development department may be discussing planning permission with a local authority for a store to be opened in three years time; the buyers are negotiating margins with suppliers for goods to be delivered in three months time and the store manager is concerned with immediate problems of staff shortages and overtime payments.

McClelland (1963) noted that the specialisation of tasks within supermarket chains leads to differing attitudes and behaviour patterns. Accordingly, he reports that the store manager cannot be authoritarian as this will result in low morale amongst staff and poor customer relations; he relies on intuition rather than logic and his 'mental processes run counter to those of the accountant or administrator'. In contrast, the buyer is 'incorruptible', 'cool and decisive'; he has knowledge of commodities, needs to have flair and be numerate (McClelland 1963).

Although the roles and responsibilities of buyers and store managers (and to some extent their attributes) may have changed since 1963, functional structures still exist and therefore the principle of differentiation still applies within supermarket chains. From their study of

Possible Information Requirements Of A Retail Grocery Chain

Table 3.2

FUNCTION	TIME HORIZON	OUTSIDE CONTACTS	KEY DECISIONS	INFORMATION REQUIRED	SOURCE
BUYING	3-6 MONTHS	SUPPLIER	LINES TO LIST/DELIST ORDER QUANTITY RETAIL PRICE PROMOTIONS	SALES TRENDS STOCK LEVELS COST PRICE PROFIT MARGIN	SALES DATA SUPPLIER INFORMATION
MARKETING /MERCHANDISING	3-6 MONTHS	MARKET RESEARCH AGENCIES /MEDIA	LINES TO ADVERTISE/ PROMOTE PRICING POLICIES LAYOUT SPACE ALLOCATION	CONSUMER TRENDS COMPETITOR ACTIVITY SALES INFORMATION PROFIT MARGIN	SALES DATA MARKET RESEARCH
OPERATIONS	1 DAY - 2 WEEKS	CUSTOMERS	WHAT/WHEN TO REORDER PRICE REDUCTIONS STAFFING LEVELS BRANCH PROFIT	SALES INFORMATION STOCK LEVELS STAFF PERFORMANCE SHRINKAGE LEVELS	SALES DATA WAGE COSTS
PERSONNEL	1-3 MONTHS	RECRUITMENT AGENCIES PROSPECTIVE EMPLOYEES	MANPOWER REQUIREMENTS TRAINING REQUIREMENTS	FORECASTED SALES STAFF PERFORMANCE	SALES DATA WAGE COSTS
ACCOUNTING	12 MONTHS	—	BUDGETS SALES FORECASTS PROFIT FORECASTS CASH FLOW	GROSS PROFIT OVERHEADS SALES DATA /TURNOVER	SALES DATA OTHER INTERNAL INFORMATION
DATA PROCESSING	1-2 YEARS	EQUIPMENT SUPPLIERS	HARDWARE/SOFTWARE REQUIREMENTS AND PRIORITIES	INDUSTRY DEVELOPMENTS EQUIPMENT COSTS BENEFITS	SUPPLIERS INTERNAL COST BENEFITS SALES/PROFIT FORECASTS

ten American companies, *Lawrence and Lorsch (1967)* observed that the more the outlook and behaviour of managers in various departments differed, the more difficult it was for them to achieve an integrated effort. A condition for good performance was found to lie in the achievement of an adequate level of integration, ie 'unity of effort among the various sub-systems in the accomplishment of the organization's task'.

As already noted, functional organizations tend towards a low level of horizontal interaction, as a result of which departmental stereotypes form. When the occasional need does arise for communication it often results in misunderstanding and conflict. This is further exacerbated by the fact that only those at the top of the hierarchy see the total picture. Departments only aim to optimise their own sub-goals, they fail to recognise the objectives of the whole organisation and the need for co-ordinated action between the various functions.

Functional structures are efficient in stable conditions and when a company's operations are based on a single range of products or services, for example supermarkets. However, problems arise when a company wishes to diversify, for example into freezer centres, DIY and garden centres or into manufacturing. When a single department, such as marketing or personnel, has to deal with all the differing needs of a diversified organization, for example different types of consumers, operating procedures and time horizons, the major benefits of a functional structure, that is simplicity and economy

are lost. In such circumstances companies may choose to adopt a divisional or product structure, with a functional structure operating within each division. Alternatively, they may choose to operate each division as a separate company. The fact that choices exist in the structuring of organizations is particularly important and will be reiterated in Chapter 6.

The communication channels in a functionally organized company are predominatly vertical and therefore it is difficult to co-ordinate activities across different departments. Consequently, the organization is slow to respond to the actions of competitors and changes in consumer needs. Thus, whilst efficient in stable conditions, problems occur with functional structures when the environment in which they operate becomes unstable.

As noted in Chapter 1, the retail grocery trade has become relatively unstable in the late 1970s and early 1980s following changes in consumer attitudes, such as the trend towards healthier eating, the move to larger out-of-town superstores, and a large number of takeovers. Thus, whilst still operating with a functional structure, this has been modified by a number of supermarket chains to improve lateral relations and co-ordination between departments. Knee and Walters (1985) note the importance of Sainsbury's policy of delegating responsibility for implementing strategy and co-ordinating activities to a series of committees. This leaves the main board to formulate strategy and give broad guidance. Knee and Walters also note that 'the committees' structure is more

important than individual functions. In other words the committees have been developed to operate across functions rather than around functions'. Such a structure overcomes three of the problems associated with functional organizations noted above: lack of co-ordination between departments; over-burdening of senior management and lack of attention to strategic issues. The committee structure comprises: Branch Operations; Finance and Audit; Director's Trading Committee; Distribution Committee; Directors Administrative Committee.

FUNCTIONAL DIFFERENTIATION, INFORMATION REQUIREMENTS AND DATA PROCESSING

This chapter has so far discussed the structuring of retail organizations and the differences between the various departments. This last section will deal with the key decisions made by those departments, their information requirements and the source of the data necessary for those decisions. Table 3.2 shows the time horizons of the various departments in relation to the key decisions which have to be made. For example, store operations are concerned with, immediate decisions, such as which lines to reorder and when, which lines should be reduced in price and how many staff are needed for next week's trading. In comparison, the accounting function is more concerned with longer term decisions of sales and profit forecasts and budgets.

Table 3.2 shows there is a variety of information required to assist the departments in their decision-making. Some

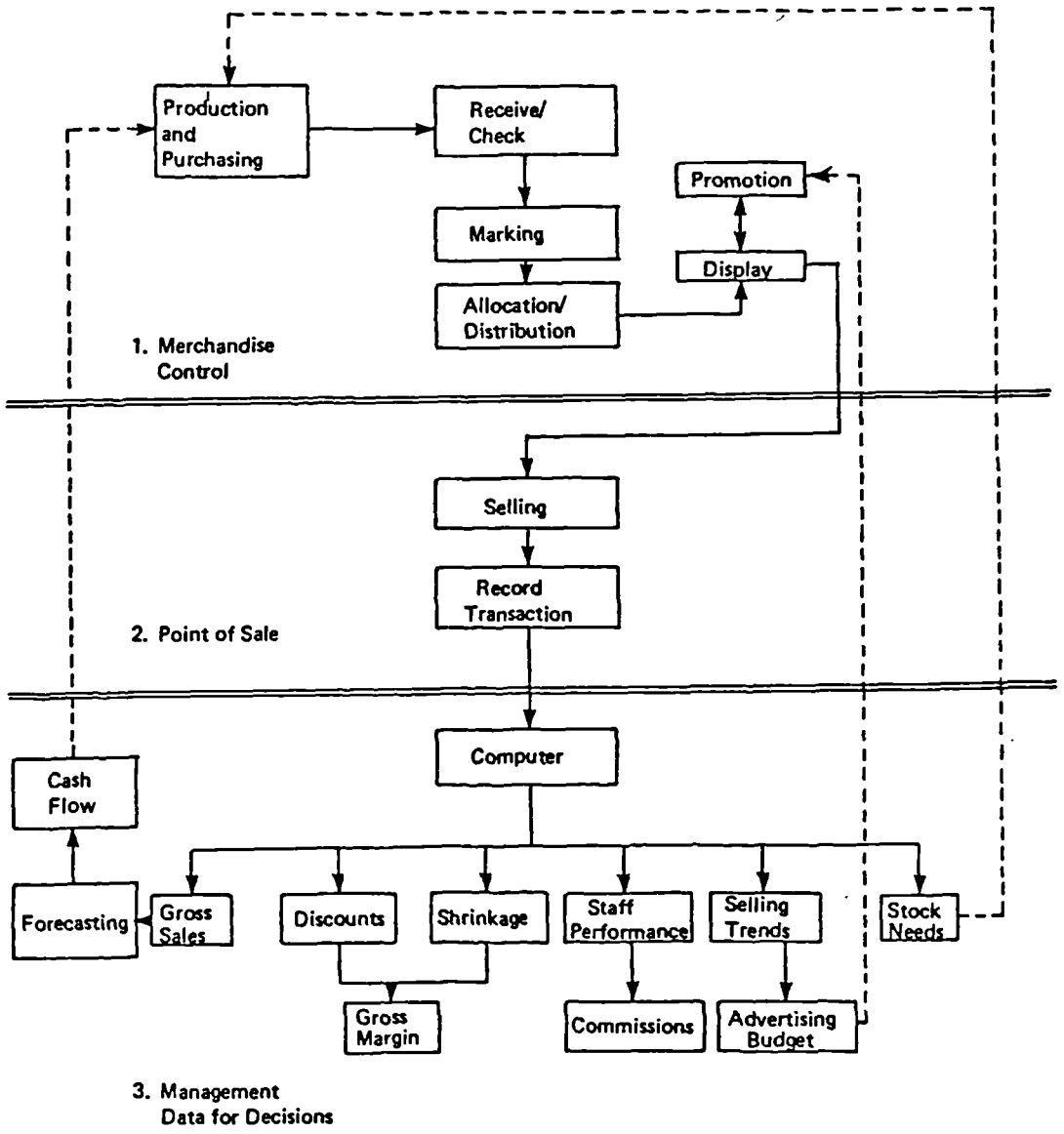
of this data is external, coming from suppliers, research agencies and observations of competitors, and some of it is internal, for example overheads and wage costs. The predominant type of information required across all departments is sales data or trends. Thus, as can be seen from Figure 3.3, data captured at the point of sale is the major source of management information for decisions made in all departments. Jones (1977) argues that the point of sale function is at the very centre of the retail management information cycle. All retail businesses are centred around the selling function and other areas within the organization are dependent upon this. In effect, the other areas within a retail organization can be regarded as a service to the selling function.

The source data captured at the point of sale can assist those in the 'service' functions in their decision-making, which in turn will have implications for the selling functions. Jones (1977) views the data captured at the point of sale on two levels, consistent with the time horizons previously referred to. First, the operational level which provides information to make day to day decisions concerning the business, for example staff performance, over and under-stock situations. Second, the data gathered at the point of sale can be built up into longer term sales history data, which can be used for budgeting, forecasting and purchasing.

The significance of data captured at the point of sale is two-fold. First, as already mentioned, this information is required by a number of different departments. It can

A Typical Retail cycle

Figure 3.3



Source : Jones (1977)

therefore be collated and processed on a single database and different programmes run for a variety of functional requirements. Second, point of sale data has advantages over the only data previously available which was based on inputs into stores. Input data does not take into account shrinkage or stock losses, nor does it reflect the exact date or time at which a product was sold. Furthermore, input data takes longer to process than point of sale data which is captured electronically. (These advantages are in addition to the economic benefits detailed in Chapter 1).

Thus, the electronic capture of data at the point of sale is designed to provide accurate, reliable and timely data which can be used by all functional departments in their decision-making processes. However, because this data is so fundamental to the business, it is of crucial importance that the systems are totally dependable and 'foolproof'. The difficulties faced by two supermarket chains in establishing these systems, utilising the data and the problems of interaction between the various departments, will be addressed later in this thesis.

SUMMARY

This chapter began by describing the historic evolution of grocery chains and identified three important features: family ownership and control; specialisation of functions and centralisation. Each of these was discussed in turn, showing the advantages, disadvantages and relationships between them. From this it can be summarised that many

supermarket chains are still owned and controlled by descendents of the founder. These chains have grown rapidly by retaining control at the centre and operating efficiently with functional structures. However, these have been modified by the addition of various committees, facilitating better co-ordination in response to an uncertain environment. The latter part of the chapter dealt with the information requirements of the various departments, stressing the significance of data captured at the point of sale and the importance of reliable systems. The next chapter will illustrate how far Laws Stores conformed to the evolutionary pattern previously described whilst later chapters explain in detail the problems faced by the company when introducing new technology.

4. LAWS STORES LTD

The aim of this chapter is to show how Laws Stores operated within the constraints of the environment discussed in the previous chapter. It begins by outlining the development of the company, with emphasis on the family ownership and the organization structure. It goes on to cover recent changes that have taken place within the company and in particular the technological developments.

HISTORY

Originally called City Stores, this family owned supermarket chain was established by Arthur McClelland who opened his first shop on Tyneside in 1907. He expanded steadily by opening four more stores over the next five years until the first world war prevented further growth. Following the war, in 1921 Arthur McClelland purchased nine stores from W M Laws and combined both the stores and the name to form Laws Stores. The chain expanded steadily by establishing additional branches and became a prominent name in the North East of England.

Following the second world war a new generation of executives took control of the company. Arthur McClelland remained as Chairman and his son, W G (Grigor) McClelland, took over as Managing Director. The company instituted several changes, the first of which, in 1949, was the conversion of all its stores to self-service, followed by

the opening of the company's first supermarket, also the first in the North East, in 1959. During this ten year period the number of stores operated by the company fluctuated as it sold its smaller inefficient branches, purchased or built larger new ones and extended existing branches. By 1960 there were fifty-one branches, the largest having a sales area of 7,750 square feet. In 1962 Grigor McClelland left the company to pursue an academic career, he remained as Chairman but handed over the daily running of the company to a Managing Director.

In 1967 the head office was transferred to new premises in Saltmeadows Road, Gateshead, alongside which was built a packing station for the processing and packaging of sausages, bacon and other provisions. In 1972 the company expanded to Scotland by purchasing seventeen stores, in and around Edinburgh. The head office functions were amalgamated with those at Gateshead, retaining only a divisional office and warehouse in Edinburgh. In 1978 Grigor, now referred to as Professor, McClelland returned to a full-time position within the company as Chairman and Managing Director. His son, Andrew McClelland, joined the company shortly afterwards, initially as General Manager for Scotland and later as Operations Director and Deputy Managing Director, thus strengthening the family presence within the firm.

In January 1985 Laws Stores was operating forty-five branches with an average of approximately 4,000 square feet of selling space. The largest branch Haddington, Scotland, with a sales area of 10,000 square feet was

opened in 1982. The company employed 1900 staff, the majority of whom were part-timers working in the branches as checkout operators or merchandisers replenishing grocery lines. Other store staff were involved in the reception of goods at the back-door or worked on the departments such as meat, fruit and vegetables, or provisions, under the supervision of departmental heads.

The branch managers were responsible for ordering goods from the warehouse and from visiting suppliers representatives, although as buying was becoming increasingly centralised these visits declined. Decisions about what lines to stock, prices charged, promotions, contracts of employment and the setting of budgets were taken centrally. Within these parameters the branch manager was expected to achieve a specific sales target for his branch, the targets were set annually by head office in consultation with area managers.

Distribution of grocery lines took place mainly from the company's own warehouse which operated with twenty seven staff, plus four office staff and a Warehouse Manager. Branches received one to five deliveries a week depending on requirements. The amount of goods being delivered direct from suppliers to the shops was declining. All frozen and chilled goods were also being delivered from a central warehouse.

The head office employed approximately 110 staff and was divided functionally into departments headed by directors. In September 1983 the board of directors consisted of the

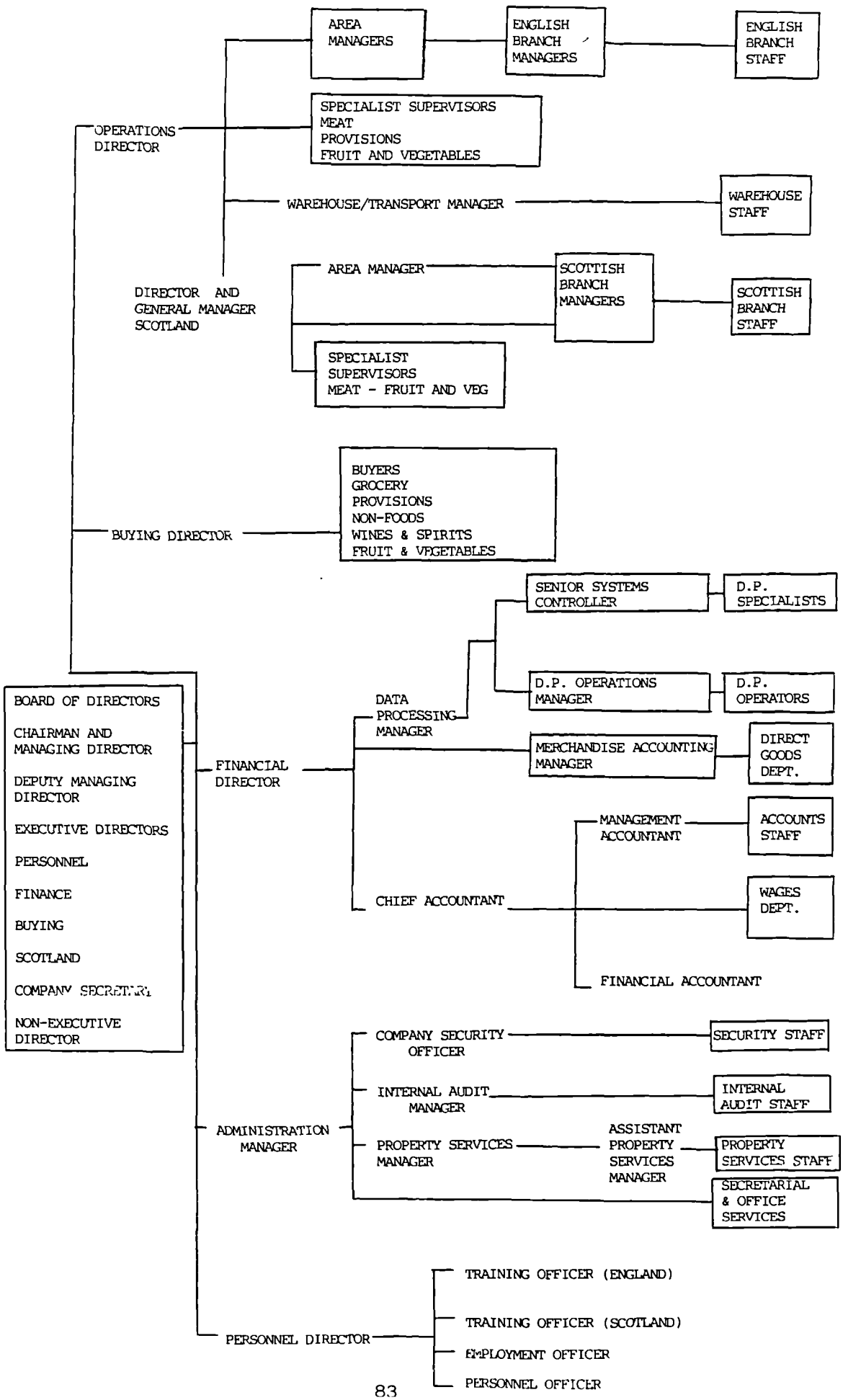
Chairman and Managing Director, Professor W G McClelland; his son, the Deputy Managing Director and Operations Director, Andrew McClelland; the Personnel Director; the Buying Director; the Finance Director; the Administration Manager and a non-executive Director (Figure 4.1). Following the Finance Director's resignation in July 1984, board responsibilities were amended (Figure 4.2). The financial aspects came under the Administration Manager who was promoted to a directorship. Most significantly the Data Processing Department became the responsibility of the Operations Director, thus underlining the owning family's dominance in key areas of the firm. The more recent organization chart (Figure 4.2) shows the vital position held by the Operations Director, who had reporting to him the General Manager for Scotland, the Warehouse Manager, three English Area Managers and the Data Processing Manager.

RECENT CHANGES

On his return to the company in 1978, the Chairman instituted a number of changes which paralleled those taking place in the grocery retail trade as a whole. However, owing to Laws limited resources in terms of finance and expertise, the changes were often on a smaller scale and lagged behind those of its competitors. Nevertheless, they enabled the company to begin to close the large gap which had developed between itself and the industry leaders. One such move was a policy of store rationalisation. In 1982 Laws closed four branches each with a sales area of less than 1,000 sq ft, extended two

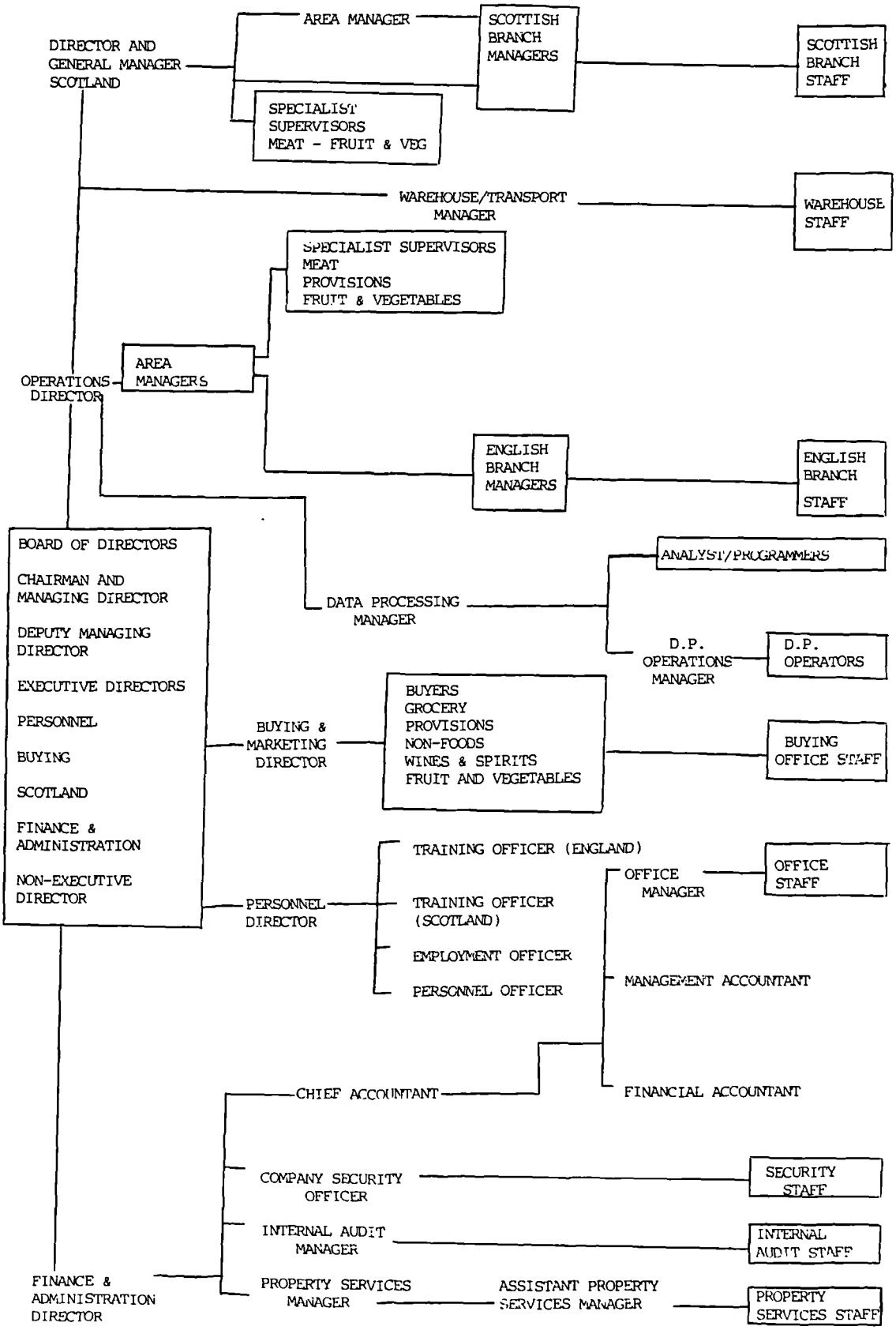
Figure 4.1

Laws Stores Ltd Organisation Chart (September 1983)



Law Stores Ltd Organisation Chart (August 1984)

Figure 4.2



existing stores and opened one new one with a sales area of 10,000 sq ft. In the early 1980s the company's total sales area increased by ten per cent and the average size of branch grew by a third.

The company also centralised its warehousing and distribution facilities closing its Edinburgh and Gateshead warehouses and, in 1981, opening a large purpose built warehouse in Felling, approximately a mile from the head office, from which distribution took place to all branches both in Scotland and England. In an attempt to reduce overheads further, the distribution facilities were contracted out to BRS who provided drivers and maintained the transport. Additionally, all chilled and frozen goods were handled and delivered by central warehouses which were also contracted out.

Changes were also instituted in the areas of buying and marketing. The corporate identity was changed to give the company a more fashionable and up-market image, a new advertising campaign was also launched. This was intended to stress the convenience, personal warmth and price competitiveness of Laws Stores, as an answer to the larger, out of town stores being opened up by such chains as Presto and the North East Co-operative Society. In response to the purchasing power of these chains, Laws joined the buying group NISA in order to gain more favourable terms from suppliers, it also introduced NISA generic products into its stores and stocked more own label lines on which there is a greater margin. Inside the stores, changes took place on the fresh food sections

with all the fruit and vegetable and meat departments being changed to self selection and in-store bakeries being introduced into five branches.

TECHNOLOGICAL CHANGES

One of the most recent and most pronounced changes which took place within Laws Stores was the introduction of new technology into virtually all areas of the business. Unlike many of the larger supermarket companies who have had in-house computer facilities for many years, all Laws data processing requirements were undertaken by a bureau based in Hull. The introduction of new technology into Laws Stores began in 1982 with the appointment of a new Finance Director. He considered the accounting machines to be antiquated and some of the manual techniques being used unacceptable. Following agreement by the rest of the board of directors, he undertook a feasibility study on the computerisation of the accounts.

Further investigations into other areas of the business, such as the branches and the warehouse, where most of the data was being generated, revealed that they would also benefit from being computerised. The Financial Director also concluded that the bureau was becoming relatively more expensive as the cost of computers declined and, in addition, was hampering the development of up-to-date systems for the company. On these grounds the Finance Director proposed the introduction of an in-house computer and the development of data processing for all company functions.

This proposal was accepted by the board and an IBM system 38 was installed in August 1982. The actual choice criteria and decision process will be explained in greater depth in Chapter 7. Briefly, IBM were chosen on the grounds that such a large and prominent company would be reliable and provide the necessary support. Furthermore, the System 38 most closely fitted Law's specifications regarding size, capabilities and cost.

The Data Processing Department which was subsequently established consisted of seven staff, including a Data Processing Manager, four Analyst Programmers and two Computer Operators. This small size was intended as a measure to keep costs to a minimum but also meant that the systems would have to be 'user-driven'. Not only would the individuals in the user departments, for example clerks, supervisors, managers, buyers and accountants, be responsible for in-putting the data, they would also be required to identify the requirements and problems associated with the systems.

The computerised systems were first used for the company payroll, followed by other areas in the accounts department, buying and personnel. By the end of two years, computerised systems had been introduced into all head office departments and the warehouse. Despite the small size of the Data Processing Department, these systems were introduced in a short time by buying all the software as packages and then altering it to suit the company's requirements. The alternative, to have all

systems tailor-made in-house, would have taken considerably longer.

Technological developments also took place within the stores themselves. Portable data capture (PDC) units were introduced into all the stores over a nine month period from October 1983 to June 1984. The equipment was supplied by MSI who claim to be the world's largest supplier of hand-held terminals. The stores placed their orders for grocery lines using these devices either daily or two or three times a week, depending on requirements. The order was transmitted to the System 38 at head office via the public telephone lines and from there it was transmitted to the warehouse for picking. The PDCs were later upgraded to include the ordering of frozen foods and chilled goods.

The most advanced development to be introduced into Laws was laser scanning. This was installed into the Whickam branch in March 1984 and Morpeth in June 1984. The two systems, which were intended as trials, were purchased from different equipment suppliers, ADS and NCR, in order to avoid dependency on one supplier. The two systems were slightly different but both were at the simplest and least expensive end of the EPOS range outlined in Chapter 2, falling into the category of micro-driven and terminal based systems.

The Whickam branch was equipped with five ADS 45 terminals linked to a microprocessor in the manager's office, attached to this was a VDU and printer. The Morpeth

branch was equipped with NCR 2126 equipment consisting of two master terminals and three slaves, consistent with the terminal-based systems previously outlined, the limited number of reports that were available from this system were printed on the receipt printer.

Several other branches were equipped with ADS and NCR checkout equipment which could be up-graded to scanning when necessary, but which were currently operating a simple price look up (PLU) system. This system, often thought of as a forerunner to laser scanning, involves assigning a velocity code to the fastest selling lines. (A velocity code is a three digit number which uniquely identifies the product). The checkout operator keys in the code which initiates an automatic price look up in the machine's memory and transmits the item price and description back to the checkout, details of the transaction are also stored in the system's memory.

With the use of the PLU system, 'hard' benefits accrue as a result of not price marking these lines individually. Instead, the system depends on the checkout operator remembering the item codes. It is claimed that the operator can remember up to two hundred codes, but at Laws the number was limited to eighty. According to IBM, 2.4% of the lines carried by a supermarket account for 85% of sales by volume. Thus velocity coding can give considerable cost savings as a result of not pricing these lines. 'Soft' benefits accrue from an increased amount of accurate sales data on the most popular lines and the itemised customer receipt. In addition to the

developments outlined above, proposals were also submitted for linking the laser scanning stores to the IBM System 38 at head office to enable the two way exchange of data.

By comparison to most other supermarket chains Laws Stores were relatively advanced in this field of new technology. Although laser scanning was first used in this country by Key Markets in 1979, when Laws introduced their first system in March 1984, most of the major multiples were still operating their equipment on a trial basis and many of the regional multiples, such as Hintons and Wm Low, did not have any systems in operation at all. This is illustrative of the rapid technological development that had taken place in Laws since the appointment of the Finance Director.

SUMMARY

This chapter has shown Laws Stores as a traditional family-owned supermarket chain operating with a functional organization structure. The company prospered during the early part of the twentieth century and continued to do well until the 1960s. However, from the late 1960s onwards it failed to respond effectively to the changes that were taking place in the retail grocery trades. It attempted to follow the trends, such as the development of larger stores, increased emphasis on fresh foods and in-store bakeries, but in most cases these developments were too late and, because of lack of resources, on a scale too small to make any impact.

One of the major changes which Laws Stores undertook was in the field of new technology. In 1982 it introduced its own in-house data processing facilities, something which most other supermarket chains had done in the 1960s. This was quickly followed by laser scanning in 1984. Thus, although late investing in computerisation, once it had begun the company progressed rapidly from having no in-house data processing facilities at all, and being well behind mainstream activities, to the forefront of technological developments in a period of less than three years. However, this process was not achieved without some difficulties which will be analysed in Part II of the thesis.

5. RESEARCH METHODOLOGY

Previous chapters analysed the background to the case study and the environment in which the company operated. This chapter looks at the research methods that were used, the problems encountered, how they were overcome and the role of the researcher in the organization. Before moving on to describe the research process in more detail it is important to explain two aspects of the methodological approach. First, that the research took place in the 'real world' (Boehm 1982), and second the concept of triangulation (Denzin 1970).

RESEARCH IN THE 'REAL WORLD'

A traditional model of research begins by selecting an area of investigation, then reviewing previous research, formulating hypotheses, designing the study, selecting the sample and, finally, conducting the study and analysing the results. However, as Boehm (1982) argues, research in the 'real world' does not fit this 'by the book' model. The nature of the research award and the close collaboration with Laws Stores outlined in Chapter 1 enabled the researcher to gain relatively easy access to the company. A participant observer role was adopted in order to extract most information from this potentially rich source of data. The researcher entered the company without any a priori assumptions or previously formulated hypotheses as is suggested by the traditional model.

Investigations within the company showed that many of the problems associated with the new technology stemmed from the nature of the organizational processes such as politics, conflict and communication. A review of previous research on new technology (to be discussed in Chapter 6) was being undertaken simultaneously with the investigation and showed the processual viewpoint to be lacking in the theoretical works on technological change. This was therefore chosen as the area to be pursued through further research.

Thus, in a reversal of the traditional research model, the methodological approach taken, combined with the problems of the organization and deficiencies in the literature, led to the definition of the area to be studied. The approach was similar to that described as 'The Discovery of Grounded Theory' by Glaser and Strauss (1968) who argue strongly against developing theory from a priori assumptions, and propose that theory is generated from data systematically obtained from the research.

TRIANGULATION

Although the research was based primarily on participant observation, a number of other methods were used including interviews, both structured and unstructured, and the analysis of documents. This procedure was referred to as 'methodological triangulation' by Denzin (1970) or a 'triad' by Faulkener (1982),

> 'each leg represents a unique mode of data collection: one from interviews with both informants

and respondents; the second from observation of people at work; and the third from documents, records and archives of the organization or industry in question'.

This multi-method approach has many advantages. Converging data from many different classes such as observation, interviews and documentary evidence, overcomes the problem that every data-gathering class is potentially biased, by employing a number of different classes the flaws of one method may be the strengths of another.

Not only were multiple methods used but also multiple sources of data, which made it possible to view the introduction of new technology from as many different angles as possible. Individuals were interviewed from all departments and levels within the organization and also, on occasions, from outside the company (See Appendix A). Documentary evidence also came from a variety of sources: memoranda (Appendix B); minutes of meetings (Appendix C); and miscellaneous company documentation such as consultants' reports, procedure manuals, historical documents and the company newspaper (Appendix D). Triangulation by data source was useful both in providing differing viewpoints and also, as one source acted as a check on another, in improving the validity and reliability of the information that was collected.

PARTICIPANT OBSERVATION

According to Denzin (1970),

'Participant observation is a commitment to adopt the

> perspective of those studied, by sharing their day to day experiences ....defined as a field strategy that simultaneously combines document analysis, respondent and informant interviewing, direct participation and observation, and introspection'.

Four types of participant observer role are identified by Denzin, these begin with the 'complete participant' who is totally concealed and who does not reveal his scientific intent. Next is the 'participant as observer' who discloses his role and establishes relationships with his subjects who serve both as respondents and informants. The third type, 'observer as participant', typically includes only one visit or interview with the respondent and the nature of the contact is brief and highly formalised. The fourth type, the 'complete observer' role, removes the field worker entirely from interaction.

On the basis of these four types the role adopted by the researcher within Laws falls into the second category of 'participant as observer'. The researcher's academic interests were made explicit, a number of subjects served as informants and frequent, unstructured interviews took place with informants and respondents. Time was also spent observing the people at work and in meetings. Occasionally, small tasks associated with the technology were undertaken by the researcher, for example assisting the Work Study Officer in checking products with barcodes that would not scan and timing throughput at the checkout.

The role of the researcher underwent continual redefinition during the time spent with Laws, gradually moving from observation to participation as her presence became more acceptable. Janes (1961) identifies five phases in this redefinition: newcomer; provisional member; categorical member; personalised member and imminent migrant. Each phase is dependent upon the degree of rapport that is established and yields data specific to that phase. Janes' categorization will be referred to throughout the chapter as an indication of the relationships that existed between the researcher and the subjects.

The 'newcomer' phase began with visits to all head office departments and the central warehouse in order to understand the operations of every area of the company. Interviews took place firstly with the functional director, then the departmental supervisors and finally a number of clerks in each department. On average, a day was spent in each department, the purpose was mainly context setting, to gather 'general orienting information' (Janes 1961), for example the function performed by each department and by key individuals, as well as the formal, and as far as possible, the informal relationships between departments. Information was also gathered on the new technology which, at this stage, had been introduced into all head office departments, although many operational difficulties were still being ironed out.

Owing to the Chairman's academic interests and contacts, employees were familiar with answering questions about

their work, albeit previously at a fairly superficial level. Consequently, they were open, friendly and well able to describe the tasks they performed and their relationships with other departments. New technology was the main topic of conversation as it had only recently been introduced and respondents readily offered their opinions on it.

In addition to providing background information and a greater understanding of the company, these initial contacts proved useful in other ways. The head office was relatively small, employing approximately 120 staff, so after only a short while the researcher had spoken to the Chairman, all directors, senior management and many of the more junior staff. Thus it was possible to gain broad acceptance throughout the company. Once these contacts had been established it was possible to pick up information during informal chats over lunch or tea-breaks. These introductions also proved useful at later stages in the research as initial contacts could be built upon when specific issues arose, without having to begin from cold as an ousider and gain the respondent's confidence.

During the 'newcomer' phase some time was also spent in the branches. First, visits were made to several stores to gain an impression of the varying types operated by the company, such as their size, location and age. Store operations were then studied in greater depth, with four days being spent in one store examining such areas as checkout operations, cash reconciliation and

administration. The researcher's previous experience as an assistant manager with a major supermarket multiple was an advantage in gaining credibility with members of the organization, particularly store managers. This was capitalised on throughout the research and whereever possible was stressed in preference to the academic aspects of the researcher's work.

After the initial visits to stores and different head office departments it was necessary to find a means to justify the researcher's continued presence within the company for two or three days each week. It was requested that the researcher be allocated a desk at which to work between conducting interviews. A desk was found in a small, quiet office only occasionally used by area managers. As this was not the ideal place in which to observe what was happening in the company every opportunity was grasped to move into various departments. For example time was spend observing the buyers as they placed their orders on the computer, observing the operators in the computer room, or visiting stores to discuss problems with the portable data capture units (PDCs), or future plans for the introduction of laser scanning.

At this time, October/November 1983, PDCs were being introduced into the stores and the Training Officer was involved in training store managers. The researcher spent some time with her during these visits and after a while it became acceptable for the researcher to occupy a spare desk in the personnel office, which was used by the

Training Officer, Personnel Officer and Work Study Officer. This marked the 'provisional member' phase in which respondents began enquiring about the research and requested comparisons between Laws and the supermarket chain for which the researcher previously worked. Owing to the Training Officer's long experience with the company (almost 25 years), much of which was spent as a store manager, her informal role was that of a 'mother-figure'. Consequently, the personnel office was often the focus of activity. Employees came seeking advice or store managers telephoned to discuss their problems or just for a chat. Therefore, this was a useful location from which to observe the organization.

Under the terms of the CASS award a senior member of the company is assigned to liaise between the organization and the academic institution. This role was undertaken by the Personnel Director at Laws who, during the course of the research, came to act more as an 'informant' than a 'respondent' (Denzin 1970). This function was also performed by other members of the organization and signalled the beginning of the 'categorical member' phase of the research. The respondent is someone who functions primarily as the person filling out or giving answers to a questionnaire or social survey, they do not perform any special tasks other than those required of them by the researcher. By comparison, the informants should

> 'ideally trust the investigator; freely give information about their problems and fears and frankly attempt to explain their own motivations; demonstrate that they will not jeopardize the study;

accept information given to them by the investigator; provide information and aid that could jeopardize their careers' (Denzin 1970).

The informants within Laws did not fulfill all these requirements, which Denzin notes are ideal characteristics, but they nevertheless performed a number of vital functions. They provided reports on events that the researcher was still 'outside' of, and opened doors to other areas and individuals that would otherwise have remained closed. They also served as a 'sounding board' for the researcher's insights and propositions. This approach was, however, used with some caution as the Personnel Director and Training Officer were principle actors in the study. Therefore, it was important not to give too clear an indication of the precise line of investigation being taken as this would unduly bias their behaviour and responses.

As informants were drawn mainly from the personnel function there was a risk of seeing the organization solely from their perspective, or being over-identified with the personnel role. Van Maanen (1982) notes that the researcher does not always have complete freedom of choice regarding informants,

'Members of the studied organization are hardly equivalent in the knowledge they posses. Field-workers do not wish to become close to just anyone, but rather want to count among their informants the more open, knowledgeable and articulate members of the organization. It is the case however that

informants probably select the researcher as much as the researcher selects them'.

Wherever possible 'facts' given by informants were cross-checked with other sources and 'opinions' followed up in interviews with other respondents. The problem of over-identification with the personnel department was countered by stressing the researcher's previous work experience in the operations side of the supermarket business and by constantly emphasising the independent nature of the research to members of other departments.

A major source of information was gained through acting as a 'fly on the wall' at meetings. It had been hoped (and confirmed by the Chairman) that attendance at board meetings would be possible. However, this was not agreed by the rest of the board who felt unwilling to 'wash our dirty linen in public' and considered that the researcher's presence at such meetings would make them reluctant to argue and 'let their hair down'. Denzin (1970) notes a problem with triangulation 'involves the inaccessibility of critical data areas, types or levels' and advises that where such situations occur a hierarchy of desired empirical areas can be constructed, if one area is closed, observers simply move to the next most desirable source. Thus, when observation of board meetings was not possible, information was obtained through interviews with directors who were present, further supported by minutes of the meetings.

Whilst access to board meetings was never gained, it was possible to attend other meetings. These were both pre-arranged, formal meetings, (for example with the representatives of equipment suppliers or store staff to discuss the introduction of laser scanning) and informal spontaneous meetings (for example between an Analyst Programmer and Training Officer to discuss PDCs, or a general discussion amongst directors over coffee). Although notes were not taken during these meetings, the topics discussed were recorded by the researcher as soon as possible afterwards. In addition to noting subject matter, records were also made of individuals' behaviour and attitudes during these meetings, which were then pursued and checked during interviews with those present.

These observations could be divided into three categories. First, the mannerisms and behaviour of individuals. Denzin (1970) defines this as 'expressive movement....concern is directed to the various features of the body that are manipulated, often in unconcious ways, to convey definitions of self and interpretations of situation'. In this way the feelings of one manager to a director were obvious in the way he continually chewed his nails while the latter was speaking.

Second, were the observations of language, such things as tone of voice, degree of deference and the use of titles were noted. For example 'friendly banter' between the data processing and personnel departments was in fact quite acrimonious when the tone of voice and expression were noted. Third, the general atmosphere of the meeting,

was observed. This included such things as: who took the more dominant role; who was more submissive or argumentative; the quality and rationality of argument that took place and the level of emotion. These three subtle elements of meetings: mannerisms; tone of voice and atmosphere are important in determining the state of relationships between individuals and cannot be identified by other means such as interviews or documentary evidence, therefore observation provided a crucial aspect in the triangulation of research methods.

PROBLEMS OF PARTICIPANT OBSERVATION

One of the problems of particpant observation is contamination. The presence of the researcher is likely to have reactive effects because the process of interaction between the researcher and the respondent creates attitudes and behaviours that did not exist before interaction. These reactive effects had to be taken into account during the first few months with Laws Stores when the researcher's presence was most obvious. However, most of the information gained in these early stages was factual and therefore less likely to be subject to reactive effects. As the researcher's continued presence within the company became less obtrusive, so it was possible to penetrate individuals and issues to a greater depth. Many informal meetings took place spontaneously in the office without the researcher attracting any attention and observations were possible without too much interference from the reactive effects of her presence.

Another major problem with the participant observer role is that of objectivity. As the researcher enters the phase of the 'personalised member' (Janes 1961) and becomes more involved and achieves 'rapport with the subjects, it is possible that the problems will no longer be interpreted impartially. However, Denzin (1970) argues that the researcher should 'escape the fallacy of objectivism' and become fully integrated with those he is studying to the extent that he loses all his preconceptions, takes the perspective of his subjects and adopts their language, values and culture. Previous experience in the supermarket industry enabled the researcher to re-adopt this language and perspective, and so become integrated into Laws Stores.

The counter-point to this is that it was necessary to avoid the problem of over-rapport. In these circumstances the researcher may cease to think as an academic and begin to adopt, uncritically, the perspective of those being studied. This 'going native' can inhibit the development of hypotheses, for the researcher finds himself defending those he is studying rather than actually studying them (Denzin 1970). Van Maanen (1982) illustrates the two perspectives available to the researcher, that of the 'outsider' and the 'insider', and the problems faced by each. He notes that in reality the pure insider or pure outsider is a 'fanciful figment of an overworked academic imagination. Qualitative researchers typically bend toward one figment or the other.... The trick lies in recognizing the limitations of the path one embarks upon'.

Whilst attempting to become an 'insider' the researcher with Laws maintained a balanced academic approach by producing weekly reports, writing working papers, and discussing issues with supervisors and colleagues. These issues were expressed in general theoretical terms rather than the specific practical problems facing the organization concerned. Furthermore, the comparison with Wm Low and Company gave a different perspective and an interval of a year between completing research with Laws Stores and the writing up of the thesis enabled a more objective approach to be taken.

DOCUMENTARY ANALYSIS

Throughout the period spent with Laws Stores, October 1983 - December 1984, documentary evidence was collected from a variety of sources. Most historical documents came from the files of the Personnel Director which contained memos and minutes going back to January 1982, the date of the initial computer proposal. The Personnel Director did not act as a 'technical gatekeeper' (Pettigrew 1973) in the sense that he controlled or handled all information relating to new technology. Nevertheless, as a member of the board it is likely that he had access to most of the formal communications about such a major issue as technology. The researcher was able to retain the file containing new technology minutes and memos, thus providing a useful permanent record which could be referred to in later stages of the research.

The documentary sources of data used, both current and historic, fall into three categories: memoranda; minutes and miscellaneous. The most useful were memoranda. Appendix B shows that these related mainly to new technolgy issues and were written by the Data Processing (DP) Manager or Finance Director and in some cases the Chairman or Personnel Director. Some memos on wider company issues also came to the researchers attention. Although an attempt was made to get onto the circulation list for all new technology memos, this was never achieved and therefore informal contacts had to be relied upon. Copies of current memos were usually obtained from either the sender or the recipient, mainly the Data Processing Manager or Personnel Director. It is recognised that this was necessarily selective and therefore introduces an element of bias, however this was counter-balanced by using other sources of documentary evidence and other research methods.

Memoranda were useful as they enabled the researcher to follow contempory issues, and indicated lines of interest to be pursued in interviews. They also provided insights through the manner in which they were written and gave an indication as to the type of person and his feelings on the subject addressed by the memo. The following memo from the Operations Director to other directors and the Data Processing Manager leaves no doubt as to his managerial style, his strength of feelings and his sense of urgency,

> 'We appear to have been making agonisingly slow progress in the job of prioritising our list of DP

projects. Accordingly I am setting myself up as Chairman of an ad hoc User Committee. Please attend a meeting in the Board Room....to crack this problem ...be well prepared for high speed decisions. I consider this meeting to be important so please adjust other appointments if necessary'.

Such memos give an indication of relationships within the organization, the sender of the above memo is clearly of higher status than those he is writing to. The propensity with which individuals sent memos and the types of response they elicited were also noted as an indication of the state of relationships. 'The style of address, the mode of presentation, the topics covered and the frequency of writing - all are revealing in terms of one's perception of another' (Pettigrew 1973).

The second source of documentary evidence was minutes of meetings. As can be seen from Appendix C these covered mainly Executive Meetings (a regular meeting of the Chairman and Executive Directors) as well as those concerning data processing developments. This information was used largely to support evidence gained at interviews and, from a historical point of view, to trace events or decisions, and to act as a check on respondents' memories. Minutes have only limited use because they give little insight into what actually took place at the meeting and are a selective record as interpreted by the person who wrote them. Denzin (1970) notes that as they are

'prepared by a person in a given organizational position they represent a peculiar stance towards the

issues contained in the report under study and observers must be sensitive to the selective bias introduced by the person preparing such reports'.

The third documentary source used was miscellaneous company documents. Appendix D shows that these consisted of Weekly Notes distributed to stores, the company newspaper - Laws Gazette, a procedure manual and information for advertising agencies. In addition, published sources of material were available on the company, for example Studies in Retailing (1963) by Prof McClelland which contains a case study of Laws Stores, newspaper reports and journal articles. These sources provided useful background information and a starting point for further investigation.

Owing to the limitations of documentary evidence, such as bias, lack of depth, and the need to understand the associated circumstances, it was always employed in conjunction with other methods. 'For case studies, the most important use of documents is to corroborate and augment evidence from other sources' (Yin 1984). The memorandum given above indicates how the Operations Director feels about the subject in question but not why, nor the circumstances which led to him sending the memo - issues which were pursued through interviews with various individuals.

INTERVIEWS

Two types of interviews were undertaken in Laws Stores: completely unstructured and a more structured, standardised approach. The type used depended on the stage in the *research process, the circumstances and the* degree of rapport with the respondent. After initial familiarisation with the company, respondents were identified in key positions in each department: the Personnel Director; the Data Processing Manager; a Buyer; an Area Manager and two Store Managers, all of whom were involved in current new technology projects. These were interviewed on a weekly basis, whilst others, the Chairman, Operations Director and Analyst Programmers, were approached when necessary.

Unstructured Interviews. The weekly interviews were unstructured and open-ended. The respondents were allowed to tell in their own words what developments had taken place with their projects that week and what their reaction to these were. Appendix E gives an example of an unstructured interview with a Branch Manager following the introduction of laser scanning. Where there was little to report, the opportunity was taken to pursue more general issues, such as, the company's general policy on technology and the degree of consultation. By using this approach the researcher was gradually able to probe more sensitive and emotive issues such as an individual's role in introducing new technolgy, his motives and relationships with other individuals and departments.

Tape recorders were not used at any point during the investigations for two reasons: one psycological, as it was felt the use of recording equipment may have inhibited the respondents; and the second practical, as the locations in which interviews took place were, literally, on the shop floor, in the warehouse or in a car while visiting branches. This latter location was a particularly rich source of data. Questions could be framed in a conversational manner, so that respondents did not realise they were being interviewed, no notes were made, there were no interuptions and no chance of being overheard. On one occasion the respondent insisted on returning to head office before beginning the formal weekly progress meeting without realising that considerable information had already been collected during the thirty mile car journey and a break for lunch in the pub. In most cases, brief notes were taken during interviews which were then written out in full as soon as possible afterwards.

It was apparent that some respondents expected the exchange of information to be reciprocal, not only were they sources of data for the researcher but the researcher was expected to supply them with information too. Therefore, extreme care had to be taken to maintain confidentiality. In some instances it was only the researcher's opinions that were sought. In such cases it was possible to maintain independence by being ambiguous and stating both sides of the argument. At other times respondents obviously sought information that others may have divulged and the researcher had to deny knowledge of these details.

In contrast to Pettigrew's (1973) impression of a 'non-naive' observer it was often felt necessary to feign ignorance in order to pursue a particular issue. This avoided disclosing a source to another respondent, enabled the issue to be seen from and entirely different point of view, and acted as a check on facts. For example, in an interview with the Data Processing Manager he indicated that the responsibility for controlling barcodes lay with the buyers. In a later interview with a buyer the conversation came to laser scanning and the researcher questioned his involvement in barcoding. Contrary to the view given earlier the response was, 'that's the Data Processing Manager's job, let him earn his corn'.

These regular, unstructured interviews continued to follow technological developments, in particular laser scanning, until February 1985, and were augmented by more focused interviews with specific individuals, where necessary. Following this, some structured questions were required to test the researcher's perception of the organization and to enable more direct comparisons to be drawn between individual's responses. A more standardised, semi-structured interview schedule was designed which included both open and closed questions.

Structured Interviews. The topics addressed in this last phase of the research with Laws included: the stability of the environment in which the company operated; the organizational structure; communication; decision-making; attitudes towards technology; the way in which it was introduced and its effect on the organization. An example

of a semi-structured interview conducted with a senior member of Laws Stores Management is given in Appendix F. The sample selected for interview included the Chairman, all directors and a number of senior managers representing various departments within the company. However, due to circumstances which will be explained later, it was not possible to interview all these individuals. The final sample of sixteen (given in Appendix A), was nevertheless representative of all departments and levels of managment from the Chairman to junior executive.

Each interview was intended to last an hour but in many cases were much longer. Some respondents felt they should 'set the record straight' or give the researcher 'a fair hearing'. This marked the final phase noted by Janes (1961), that of the 'imminent migrant'. During this time respondents and informants take on a sense of urgency concerning how they are going to be described by the investigator in his written reports, and may try to exert pressure regarding the total investigation. Denzin (1970) terms this 'a process of role-disengagement. Field relationships will be terminated, and though friendhips established will linger, continuous interactions with those observed will cease'.

WM LOW & COMPANY

Undertaking a second study with Wm Low enabled the researcher to draw comparisons between two companies operating under similar conditions, but varying in certain

significant aspects, particularly their approach to new technology. Mouzelis (1967) argues for the use of the comparative approach to combine methodological rigour with deep insight, 'by strategically choosing a few cases (say two to five), it is possible to combine intensity of study with comparative variations of significant variables'.

The most obvious similarities between the two companies were that they were supermarket chains operating in depressed areas of the country, as such they were confronted with the same economic pressures and threats from the larger supermarket operators. Most importantly, both operated within the same rapidly developing technological environment which included laser scanning, electronic funds transfer, the increased use of micro-computers and improved telecommunications. Furthermore, both companies had similar historical backgrounds being established around the turn of the century and originally family-owned firms. However, Wm Low was now a public company with both a non-family Chairman and Managing Director. Significantly, the history of technological developments was very different from Laws, as was its approach to current developments - points which will be expanded in Chapter 11.

The research with Wm Low took the more formalised approach of the 'observer as participant' type (Denzin 1970). This was due to the larger size of the company, the short time available and the distant location. In addition, interviews could be more focused because of the researcher's greater knowledge of the supermarket industry

and the technological and organizational issues that were being explored. The initial visits to the company were spent conducting focused interviews with as many managers as possible, both in the stores and head office. Information was collected on the company's operating methods, style of management and approach to new technology. In between interviews, time was spent in the personnel office, this was not the focus of activity to the same extent as at Laws but nevertheless provided some information. Discussions over lunch and coffee also proved useful and two informants provided data.

During later visits more structured, standardised interviews were conducted in order to draw comparisons across the company and with Laws Stores (see Appendix G). The interview schedule was similar to that used at Laws, but was modified slightly in accordance with the circumstances and technology in use at Wm Low. (The interview schedule is given in Appendix H). The interviews were undertaken with 13 key respondents who had been identified in the previous phase of the research. Unfortunately the company accounts were being compiled during this time and members of the accounts department were not available for interview, however the sample was representative of all other departments and all levels of management. The material drawn from Wm Low was not as detailed as that from Laws Stores. Nevertheless, it clarified some points from earlier data and enabled some comparative analysis to be undertaken.

SUMMARY

The participant observer role adopted by the researcher enabled the 'real world' problems involved in the introduction of new technology to be identified, and defined as the area for further investigation. In accordance with the concept of 'methodological triangulation', participant observation was combined with interviews and documentary analysis, thus overcoming the difficulties and inherent bias associated with the use of a single research method. The investigation in Wm Low facilitated a comparative analysis of two similar organizations which differed in significant aspects, in particular their approach to new technology. By employing these research methods a rich source of empirical evidence was established on which to further develop the thesis.

6. THEORETICAL CONSIDERATIONS

Previous chapters have established the background to the study in terms of the retail industry, the company in which the research was undertaken and the methods used. The aims of this chapter are three-fold: to highlight the gaps in the literature on new technology and show where this thesis fits in; to provide a synopsis of previous works on organizational behaviour which were found to be most relevant; to clarify the concepts and terminology which are used in the latter half of the thesis.

NEW TECHNOLOGY LITERATURE

Many authors (Bessant and Dickson 1982, Winch 1983, Wright and Rhodes 1985) trace the literature on technology, originally referred to as the 'automation debate' (Benson and Lloyd 1983), back to the 1950's following the invention of the transistor in 1948. The studies are variously described as being 'optimistic' or 'pessimistic' and the development of the technology itself as being 'revolutionary' (Wright and Rhodes 1985) and 'evolutionary' (Bessant and Dickson 1982). As the technology advanced, became cheaper, more widespread, and the implications more fully realised, so the literature proliferated. The latest advancement in technology, and associated wave of literature, stems from the late 1970's and the debate on the impact of microprocessors and silicon chips following the 1978 BBC documentary 'Now the Chips are Down' (Huws 1982).

Despite this extensive literature on technology it is deficient in a number of respects and much of it is not entirely relevant to the research reported here. One of the deficiences in the literature is that much of it has been technical, either describing the hardware choices available (RMDP 1982, Mussannif 1983, Jones 1977) or taking a systems or operational research type of approach (Tricker 1982, Pendlebury 1981). This literature is undoubtedly necessary and useful but, apart from a short section on the retail technology in use in the case study company, outside the scope of this research.

For many years the technical literature predominated, whilst studies of the effect of new technology on the behaviour of individuals and organizations was lacking. Recently however, there has been more attention paid to these behavioural aspects. Nevertheless, much of this has again been outside the scope of this research as it has focused on issues and taken approaches quite distinct from that of the research reported here. This is not to say that some of the literature has not been appropriate and this will be referred to later. To understand where the present work fits into the existing literature on behavioural aspects of new technology, it is necessary to look at the issues and approaches taken by previous research.

First, there is the question of the level of the research. On the one hand are the studies at the macro level (Benson and Lloyd 1983), which focus on issues such as the diffusion of technical change, social, economic and

political issues. Whilst on the other hand are the studies concerned with the role of, and effects on, the individual (Sawers 1985, Cross 1983, Buchanan and Bessant 1985). These address such questions as: how will the new technology affect the content of jobs; will it lead to more or less skills; how will it affect the physical working environment and how will the worker be compensated for the changes.

Additionally, there are studies of individual enterprises. Previous research at this level has tended to focus on the structural implications of new technology, questions of centralisation versus decentralisation, and technological determinism versus strategic choice (Buchanan and Boddy 1983, Mansfield 1984, Robey 1977). As the research reported here took place with two case studiy companies, Laws Stores and Wm Low, it is this literature focusing on individual enterprises which is most relevant. However, contrary to the approaches outlined above, the emphasis in this thesis is towards a more processual viewpoint. It investigates at the process by which decisions are reached and implemented, including the effect of the present power balance, mechanisms of integration, and the state of lateral relations. The implications of this type of approach highlight another deficiency in the literature: it's tendency to focus on the <u>impact</u> of technological change rather than the <u>process</u> by which it is achieved (for example, EFILWC 1983). This was noted by Mcloughlin et al (1985);

> 'most attention has been focused on either the "impacts" of new technology or the social choices and

> decisions that underlie management strategies for its introduction... At present little detailed data exists on the approaches taken within organizations to the problems of managing the implementation of technological change.'

Technological change should be seen as a dynamic process in which issues, events and relationships are changing daily, it is not simply a static phenomenon which can be exemplified by comparison of the situation 'before' and 'after', as is implied by many of those who undertake research into the impact of new technology. It is a process which can last for many years, indeed many companies who endeavour to keep abreast of technological developments find themselves in a continual cycle of: review of current operations; decision to introduce new technology; implementation; operation; further review; up-grading of technology and so on.

Clark (1984) identifies five phases in the process of introducing technological change: (1) the decision to computerise; (2) choice of equipment; (3) implementation; (4) initial operation and (5) routine operation. The implementation process alone can take many years, for example first the new systems are introduced into the production or operations side of the business, then the finance department, followed by the personnel office, the marketing function and so on; by the time new systems have been introduced into all areas of the business, those in the production department are obsolete.

Implementation may be prolonged because those who are to use the technology are geographically dispersed. In the introduction of a new computerised system into British Rail freight operations (Mcloughlin et al 1985) the implementation period took four years. The process involved 'task force' teams travelling the country to 150 locations to train the staff and bring each point on-line with the central computer. This problem of geographical dispersion is particularly acute in retailing. Many organizations pride themselves on the speed at which they can introduce new technology into their branches. Solway (1985) reports that 'In the space of fifteen months we have installed scanning into 150 Shopper's Paradise branches, averaging two installations per week.'

Whilst some studies investigate the impact of technology, others focus on specific phases within the cycle outlined above, for example the decision-making process (Pettigrew 1973), the introduction strategy (Child 1984), or the implementation process (Mcloughlin et al 1985, Mehra and Reid 1982). In contrast to these specific, and generally static, approaches this researcher followed developments in Laws Stores over a three year period and was able to study the whole process from the pressures to computerise through to routine operation of the technology.

Another criticism is that many studies are concerned only with industrial relations issues. These can be either at the macro level, such as the effect on the overall level of employment and the structure of the workforce (MSC 1985); at the enterprise level, for example conflicts

between management and unions, problems of overcoming resistance to change (Wilkinson, 1983); or at the individual level, such as changes in job content, retraining, ergonomics and remuneration (Huws 1982). By comparison, there is less literature available on management aspects of technological change, such as the relationship between computer specialists and line staff, individual manager's resistance to change, the reasons for it and how it can be overcome. This particular study is concerned with new technology as it affects management and directors, including all levels from store managers or junior head office executives up to the Chairman of the company.

A criticism of other publications is that they tend to be prescriptive or normative, with the aim of instructing managers in how things should be done.

> 'There is very little information about what is actually taking place' (Bessant and Dickson 1982). This is particularly true about studies of new technology in retailing. Sawers (1984) notes, 'While there is an extensive literature on new information technology applications in retail operations; it is largely didactic and, with a few notable exceptions, it is generally lacking in systematic empirical investigation, and offers little in the way of solutions to the challenges posed by such developments.'

In contrast to the normative literature currently available, the approach taken here is a descriptive one,

relating what actually took place in two organizations introducing new technology, the process by which this was achieved and the roles of individuals involved. The analysis is based on a discussion of the relevant organizational behavioural issues such as power, politics, conflict, co-ordination and integration.

A further criticism is that many of the books on new technology consist of a series of papers, frequently the proceedings of a symposium, which are often disparate (Piercy 1984, Bjorn-Anderson 1980, Winch 1983, Marstrand 1984). They tend to range over a variety of different issues where frequently the only common thread is some vague and often tenuous link with technology. In other instances the literature is based on a series of individual and entirely separate case studies (Buchanan and Boddy, 1983) which are later combined to form the basis of a publication. Whilst such literature gives a number of different viewpoints and an impression of the broad range of problems and issues involved in the introduction of new technology, it fails to develop a coherent and consistent argument or provide a suitable theoretical framework for the analysis of such problems.

Elements of the above works will be discussed in the thesis. For a greater understanding of the issues and principles underlying the research it is necessary to look at the literature on organizational behaviour. In order to understand the relationship between technology, organization structure and environment in Laws Stores the work of the contingency theorists was referred to. They

maintained that the structure of an organization was largely determined by a variety of situational factors, such as environment, technology or size.

ORGANIZATIONAL STRUCTURE AND ENVIRONMENT

A major piece of research on the relationhip between organization structure and environment was undertaken by Burns and Stalker. They saw their research as, 'a contribution to the study of problems related to the exploitation of scientific discovery by industry in peacetime conditions' (Burns and Stalker 1961). Although undertaken in the late 1950's the aims of the research by Burns and Stalker are nevertheless still relevant. Companies continue to face problems in trying to keep abreast of technological advances and, on the whole, the solutions to those problems remain elusive.

Based on their own observations and on interviews with managers in twenty firms, predominantly in the electrical industry, Burns and Stalker found that the type of organization structure differed depending on whether the environment was rapidly changing or relatively stable. Mechanistic structures, appropriate to stable conditions, are characterised by differentiation of tasks into specialist functions and a high degree of formalisation. Each individual's job is precisely defined, his tasks are clearly specified and performed according to predetermined rules and procedures. There is a hierarchical structure of control, authority and communication. Virtually all interaction tends to be vertical, ie between superior and

subordinate. The whole organization is controlled by 'somebody at the top' who, because of the hierarchical nature of the system, is the only one who knows what is going on in all areas of the business and therefore is able to co-ordinate the various activities.

The organic type of organization is adapted to an unstable and rapidly changing environment. According to Burns and Stalker (1961) it is

> 'appropriate to changing conditions which give rise constantly to fresh problems and unforeseen requirements for action which cannot be broken down or distributed automatically arising from the functional roles defined within a hierarchic structure.

'Accordingly, the characteristics of this type of organization include ill-defined roles and task specifications. Each individual performs a different role and task according to changing circumstances. Control, authority and communication exist as a network, flowing up, down or horizontally as determined by the task. Knowledge may be located anywhere in the network, depending on who has the expertise for the current task. This location becomes the centre of authority for a short period only, authority will move elsewhere in the organization as the environment changes and similarly the organization changes its focus to another task.

Lawrence and Lorsch (1967) placed organizations on a stable-dynamic continuum similar to that of Burns and Stalker. They concluded that, in a general way, their

results 'strongly support these conclusions of Burns and Stalker'. They carried out their research in the plastics, food, and container industries, as these were thought to represent three totally diverse industry environments. The plastics industry is highly competitive, product life-cycles are short and the firms are characterised by continual new developments. The container industry, at the other extreme operated in a relatively stable and certain environment. There were no significant new products and sales increased steadily, but slowly, in line with population growth. The food industry was seen as lying midway between the two. There was heavy investment in innovation but new product generation and sales growth were less than plastics but greater than containers.

With regard to the organization's internal structure Lawrence and Lorsch looked at two dimensions: differentiation and integration. Differentiation for Lawrence and Lorsch means not only the division of labour into various functional departments but also differences in approach to work. 'By differentiation we mean these differences in attitude and behaviour, not just the simple fact of segmentation' (Lawrence and Lorsch 1967). Therefore, as well as looking at variations in formality of structure, the researchers investigated the divergence among functional managers in their orientation towards particular goals. This included differences in time orientation and differences in interpersonal orientation. The term integration is defined by Lawrence and Lorsch as 'the quality of the state of collaboration that exists

among departments that are required to achieve unity of effort by the demands of the environment.' It is taken to mean not only the state of inter-departmental relations but also the process and devices by which they are achieved.

Lawrence and Lorsch perceive both the environment and the internal organization to be composed of sub-sets. Thus, parts or departments of the organization could deal with parts, or aspects, of the environment. Furthermore, they postulated that the more diverse the environment, for example the plastics industry, the more highly differentiated the organization would need to be and more complex integrative mechanisms would be required. Conversely, the simpler the the environment, for example the container industry, the less differentiated the organization and the fewer the integrative mechanisms would be required. The research proved their hypothesis to be true. When firms within each industry studied were divided into high, moderate and low performers, it was found that high performers had structures which best fit their environmental demands.

ORGANIZATIONAL STRUCTURE AND NEW TECHNOLOGY

The relationship between technology and organization structure has been researched and debated since the 1960's. For example, Joan Woodward (1965) undertook a survey of 100 manufacturing firms in South East Essex. Each firm was placed on an eleven point scale of production systems ranging from the manufacture of single

units tailored to individual customer requirements, through mass production of standardized goods, to the most technically complex task of continuous flow production.

Analysis of data relating organizational variables to this scale of technological complexity showed three trends. First, it established a linear relationship between a firm's technical complexity and aspects of its organization chart and personnel ratios. Second, it revealed a 'U-shaped' curvilinear relationship between a firm's technical complexity and its type of social structure according to the scale developed by Burns and Stalker (1961) ranging from 'organic' to 'mechanistic'. Third, it was found that firms were more successful financially when they conformed to the median organizational form for their 'technology group' than when they diverged from it. The classical principles of management, with emphasis on clear, formal definitions of responsibility, seemed to be appropriate for the success of large batch and mass production firms but detrimental to the success of both unit and process production.

Following her research Woodward concluded that,

> 'The case studies confirmed that variations in organizational requirements between firms are nearly always linked with variations in their techniques of production... The background survey showed that the successful firms approximated to the medians of the group in which they had been placed. This indicates that the medians for each group represent a pattern of organization appropriate to that group'.

Woodward's work, whilst having a number of supporters (Harvey 1968; Zwerman 1970), was also subject to criticism based largely on the failure of subsequent studies to replicate the original findings (Donaldson 1976).

Following Woodward, a number of researchers attempted to investigate the link between technology and structure. Perrow (1970) disagreed with Woodward's second thesis that there was a curvilinear relationship between technology and structure. He proposed folding the scale in the middle thus producing a technological continuum from routine to non-routine. Therefore the relationship between technology and structure is seen as linear rather than curvilinear. Whilst Perrow himself did not test the theory empirically others have done so (Hage and Aiken 1969, Van de Ven and Delbecq 1974) and found that their research largely supported the predictions made by Perrow.

Contrary to these findings the work of Pugh et al (1968), which came to be known as the Aston Studies, reported no statistically significant relationships in thirty-one manufacturing firms between a measure of technology, largely the degree of automation of the work, and various measures of structure. In addition, Hickson et al (1969) also used Woodward's original scale as a measure of technology. Although a few of the relationships with structural variables were statistically significant, analysis indicated that they were spurious, and were in fact attributable to the effect of organizational size. 'The irrelevance of technology is emphasized when the effects of size are removed' (Hickson et al 1969). More

important, since this was the original unfolded version of the technology scale, no curvilinear relationships were found that were both statistically significant and substantively important.

A re-examiniation of the Aston Group findings by Aldrich (1972) suggested that the data could be interpreted to support a relationship between technology and structure. Mohr (1971), on the other hand, in a further attempt to replicate Woodward's findings failed to find evidence to support her hypothesis that 'the effectiveness of an organization is determined by the consonance between its technology and its social structure' (Mohr 1971).

What are the reasons for such contradictory evidence on the relationship between technology and structure? The differences stem from the fact that both technology and structure are multi-dimensional variables and problems arise because researchers have interpreted and measured the variables in differing ways. According to Mohr,

> 'A first source of discrepancy in the above findings lies in the lack of agreement in the conceptual definition of technology. Clearly technology is not in itself a variable but rather only a very broad concept that must become more specific to be useful in research and theory.'

Critics of Woodward suggest that her measure of technology, based on the complexity and predictability of the production system, is crude and unreliable. Furthermore, her methodology, relying primarily on

subjective observations and interviews is open to interpretational bias (Robbins 1983). In addition, the concept of performance is also brought into question, Woodward claims that a consonance between structure and technology will enhance the organization's effectiveness. However, others argue that different organizational members and groups, pursue a variety of goals and interests and therefore raise the question - more effective for whom? (Dawson and Wedderburn 1980).

Another cause of confusion in the studies is the level of analysis undertaken by the researchers (Gerwin 1979). The Aston studies were similar to those of Woodward in that they considered the predictability of the whole system, whereas others (Perrow 1967, Hage and Aiken 1969) concentrated on the predictability of the work done by individuals.

Hickson et al (1969) offer their own explanation for the discrepancy between their findings and those of Woodward.

> 'Structural variables will be associated with operations technology only where they are centred on the workflow. The smaller the organization the more its structure will be pervaded by such technological effects: the larger the organization the more these effects will be confined to variables such as job counts of employees on activities linked with the workflow itself and will not be detectable in variables of the more remote administrative and hierarchical structure.'

Fry (1982) reviewed the technology-structure literature from 1965-1980 and found three main reasons why it 'seems to have generated more controversy than agreement'. First, there are the differing conceptualisations of technology and structure; second, the different levels of analysis and third the different types of measures. When these influences were taken into account Fry concluded that 'with some exceptions, strong support was found for the existence of technology-structure relationships.'

Apart from the failure of further research to replicate the findings of Woodward a further major criticism was based on the deterministic stance which she is purported to have taken. Eilon (1977) rejects the thesis that organization structures may be causally determined by their technology,

> 'Such a conclusion simply offends the the intuitive belief of many of us in the existence of choice in organization design and the validity of the notion that firms can be restructured as a result of conscious managerial decisions.'

This criticism of Woodward is not entirely valid as closer scrutiny of her work shows that she did not advocate the wholly deterministic view which is attributed to her. Indeed, her reason for studying technology was one of operational simplicity and she qualifies the relationship between technology and structure by saying, 'technology did not so much determine organization as define the limits within which it could be determined' (Woodward, 1965). Therefore, the label of 'technological determinism'

for Woodward was not fully warranted. Nevertheless she, and her fellow contingency theorists, largely overlook the important role played by management in influencing the structure of their own organizations. Furthermore, the contingency theorists do not recognise the existence of the plurality of interests within organizations nor the existence of powerful individuals or sub-groups who have the capability of influencing both the technology and the structure adopted by the organization. These issues of managerial choice, sub-group interests and conceptions of power and politics within organizations, will be discussed throughout the thesis. The key elements in the literature relating to these subjects are presented in the rest of this chapter.

STRATEGIC CHOICE

The concept of 'strategic choice' was introduced in 1972 by John Child as an alternative to the views of the contingency theorists. Child drew attention to the fact that researchers ommitted to take into account one very important factor - the ability of the organizational decision-makers to exercise choice in structuring their organizations.

With reference to the notion of organizational performance which is contained in the work of the contingency theorists Child accepts that 'it is likely that in most cases organizational decision-makers do believe that structural design has some consequences for performance', but stresses an important proviso: if performance exceeds

a satisfactory level, decision-makers may choose to trade-off some potential gain in performance for a 'congenially' structured mode of operation. In other words, they may be able and willing to exercise some choice over performance standards. Child further argues that in addition to being able to exercise choice over organizational structure and performance standards, the decision-makers may also have some power to 'enact' their organization's environment.

Using several case studies of technical change, Buchanan and Boddy (1983) sought to investigate the notion of 'technological determinism' versus 'strategic choice'. They found that whilst the organization structure was affected by the technology in every company studied, it was not the technology which determined the organization structure but how technology is used. Buchanan and Boddy concluded that there were choices available in the way work was organized and structured around the technology,

> 'The cases demonstrate that: The changes to structure that accompany technological change reflect strongly and directly the expectations and objectives of management, and weakly and indirectly the characteristics of the technology' (Buchanan and Boddy 1983).

Some writers question the idea that technological change can be seen as one well-formulated, coherent and consistent strategy based on the expectations and ideology of management. The work of the New Technology Research Group at the University of Southampton (Clark 1984,

Mcloughlin et al 1984) rejects the argument that management is able to develop a single unitary strategy towards the introduction of new technology. Instead, it favours a view of managerial actions as a series of flexible and changing sub-strategies associated with different stages in the process of change. Each sub-strategy develops as a reaction to current pressures, opportunities and constraints, rather than as clear-sighted proactive decisions and choices. Thus, the emphasis shifts from a concept of strategic choice based on management ideologies and expectations, to one which results from a reaction to problems and pressures which prevail at the time each sub-strategy is evolved. Such problems and pressures include a whole range of economic, technical, social and political factors.

It is the internal social and political factors and processes, such as lateral relations, power, conflict, communication and integration which were of particular interest in the case study reported in this thesis. Therefore, the literature guiding the researcher's work in this particular field of organizational behaviour will be discussed later. Having reviewed the literature on technology, organizational structure and strategic choice, the next section studies the relationship between strategy and structure.

STRATEGY AND STRUCTURE

One of the most influential proponents of a link between strategy and structure has been Chandler (1962). Taking

an historical perspective he studied the development of seventy large American firms over the period 1901 to 1959 and identified four phases in the growth of the large American corporation:

> 'the initial expansion and accumulation of resources; the rationalisation of the use of resources; the expansion into new markets and lines to help assure the continuing full use of resources; and finally the devlopment of new structure to make possible effective mobilisation of resources to meet both short-term market demands and long-term market trends' (Chandler 1962).

From his research, Chandler concludes that structure follows strategy, the thesis for which he is now well-known. In addition he goes on to say,

> 'one important corollary to this proposition is that growth without structural adjustment can lead only to economic inefficiency. Unless new structures are developed to meet new administrative needs which result from an expansion of a firm's activities into new areas, functions or product lines, the technological, financial and personnel economies of growth and size cannot be realised'.

Whilst Chandler's thesis that structure follows strategy is an important one in its particular context, it must be put into perspective (Robbins, 1983). The underlying research was not concerned with a cross-section of firms but studied only large, successful, growth-oriented firms in the U.S. over a particular time period. Therefore, it

is not known whether the results are appropriate to static or declining, small or medium-sized firms in the U.K. at the present time.

Other researchers (March and Simon 1958, Cyert and March 1963, Miles and Snow 1978) argue that in fact structure constrains strategy, 'once an organization has developed a particular strategy-structure arrangement, it may have difficulty pursuing operations outside its normal scope of operations.' (Miles and Snow 1978). Cyert and March argue that organizational structures and processes evolve to prevent the organization becoming overwhelmed by uncertainty. Large and complex problems are broken down to enable them to become more manageable and are dealt with by organizational sub-units. However, the rules and procedures associated with such structures restrict the senior management's search activities to within their own familiar domain and so restrain their choice of alternative strategies. From this viewpoint it would therefore be logical to conclude that strategy follows structure.

The complex interaction between strategy and structure is recognised by Miles and Snow (1978), who, in an attempt to clarify the situation, conducted research in which they 'looked not only for consistencies in the alignment of strategy, structure and process, but also for the structural constraints on strategy.' Miles and Snow studied a large number of firms in the textbook publishing, electronics and food processing industries and in hospitals. They first developed a model to explain the

process by which organizations adapt to their environment, referred to as the 'adaptive cycle', and secondly developed a typology to illustrate the alternative forms of adaptive behaviours referred to as 'strategic types'.

The adaptive cycle is broken down, for the purposes of analysis, into three major problem areas: the entrepreneurial problem is the definition of the organizational domain; the engineering problem involves creating a system to produce and distribute the chosen products or services and the administrative problem is seen primarily as that of reducing uncertainty for the organization. Miles and Snow point out that whilst adaptation frequently occurs by moving sequentially through the entrepreneurial, engineering and administrative phases, the cycle can be triggered at any one of these points. In addition they state that, 'adaptive decisions made today tend to harden and become aspects of tomorrow's structure' (Miles and Snow 1978). Thus stressing the point that patterns of adjustment that evolve as a solution to a particular problem will constrain the strategy in the next cycle of adaptation.

Miles and Snow identified four adjustment patterns, which they call strategic types. Each type 'has its own strategy for responding to the environment and each has a particular configuration of technology, structure and process that is consistent with its strategy' (Miles and Snow 1978). The first of these types, the defenders, are organizations which have narrow market domains and seldom look elsewhere for new opportunities. They rarely make any

changes to their technology, structure or procedures but devote attention to improving the efficiency of the existing operations. As a result of this narrow focus, defenders are difficult to dislodge from their particular niche, but may be threatened by any major shift in the market. The second type, the prospectors, are continually searching for new market opportunities. They are often the creators of change to which their competitors must respond, but as a result fail to become totally efficient.

The third type, the analysers, are companies which tend to operate in two types of market. In the stable environment they operate routinely and efficiently, whilst in the other, changing market, they rapidly adopt those new ideas which appear to be most promising. If it does not maintain a balance between these two markets such a company may face difficulties. The final type, the reactors, exhibit characteristics which are both internally inconsistent and inappropriate for the environment in which they operate. The top managers may perceive changes occurring in the market but are unable to respond effectively and are unlikely to make adjustments of any sort until forced to do so by environmental pressures.

POLITICS, POWER AND INFLUENCE

Whilst internal politics is recognised as an important factor in the life of an organization, most writers and researchers pay little attention to it. Child (1977) refers to political behaviour twice, but then only

briefly. In the first reference he raises the important point that,

> 'structure itself often becomes victim to politics, and indeed it will not be allowed to operate effectively if it does not reflect political forces within the organization... Political ambitions are frequently a driving force behind structural changes.'

The second reference relates political activity with its involvement in the decision-making process.

> 'Any decision within organizations is reached and implemented through a political process. Politics is about the use of power, and decisions are a formalization of that use, which will have to be reached through negotiation and compromise when power is spread among several parties.'

Thus, whilst recognising the existence of politics within organizations, Child deems the topic sufficiently important to warrant only two short paragraphs.

In addition to being important in decision-making processes, as noted by Child, politics is also an important force during times of change. This was commented on by Machiavelli as early as the fourteenth century in his treatise on the principles governing politics, statecraft and power.

> 'And it ought to be remembered that there is nothing more difficult to take in hand, more perilous to conduct, or more uncertain in its success, than to take the lead in the introduction of a new order of things. Because the innovator has for enemies all

> those who have done well under the old conditions, and lukewarm defenders in those who may do well under the new. This coolness arises partly from fear of the opponents, who have the laws on their side, and partly from the incredulity of men, who do not believe in new things until they have had long experience of them.' (Machiavelli 1958).

This is particularly true of technological change, as was observed by Buchanan and Boddy (1983) in their review of several case studies they found that 'technological change is a political process as the expectations of those concerned conflict'. However, despite this recognition, the subject is not given a great deal of attention.

The neglect of power in organization theory literature was recognised by Pfeffer (1981) who suggested a number of reasons for this. The first of which concerns the conceptualisation of power and the pervasiveness of it. Due to its imprecise nature, power can be used to explain almost everything and in particular those things which cannot be accounted for by other ideas. In addition, the assessment and measurement of power and politics are by their very nature 'difficult nettles to grasp' (Pettigrew, 1973).

The study of politics provides problems of a practical nature for the researcher (Mouzelis 1967); researchers rely on the co-operation and financial support of those who control the organization and therefore are not going to support studies which appear to be harmful or disparaging. It is likely that many groups would hinder

the researcher's attempts to probe the power structure and political struggles taking place. Moreover, the researcher faces difficulties of an ethical nature, whether or not to disclose his intentions to his subjects and in doing so jeopardise the whole purpose of the research.

Pfeffer proposes that a further reason for the neglect of power and politics is the availability of competing perspectives for understanding organizations. These are generally more acceptable as they conform to the values of rationality and effectiveness that is expected of managers and organizations. The third and final point made by Pfeffer is that the concept of power is troublesome to managers because of its implications and connotations. As Burns (1961) points out no-one regards himself as a politician or as acting politically because the term is so often used in a pejorative sense.

Despite these problems, and the general lack of attention to the subject, there have been a number of works focusing specifically on power and politics in organizations (Burns 1961, Emerson 1962, Hickson et al 1971, Bacharach and Lawler 1980). Probably one of the most notable of these works (and from this researcher's point of view one of the most relevant) has been that of Pettigrew (1972, 1973, 1975, 1985). Pettigrew's early work, reported in his book, 'The Politics of Organizational Decision Making' (1973), was based on a longitudinal study of the decision-making process involved in the purchase of a

computer for a retail company. Hence the significance for this particular research project.

The focus of the study was the process of mobilising power and support for the various hardware alternatives favoured by the members of the computer department and their attempts to influence the board of directors. The period covered, 1957-1968, involved four computer purchase decisions, the last of which was covered in great detail as the author acted as participant observer during this period. Such a role allowed him access to information not normally available to researchers and put him in a position to be able to study political activity. 'If the researcher is interested in covert activity, in political behaviour, it is essential to be close to the ground of the action' (Pettigrew 1973).

There are a number of important threads running through the book, many of which will be referred to again throughout this thesis. The main conclusion however is that,

> 'This research has tried to put forward a conception of decision-making as a political process... Innovative decisions were seen to be a special source of political behaviour in the sense that the dynamics of their process and their outcomes had an impact on the distribution of resources' (Pettigrew 1973).

In taking a processual viewpoint, Pettigrew attempted to link the strategies of the various interested parties to a particular decisional outcome by tracing the generation of

demands and the mobilisation of power in the decision process. He argues that a more complex and differentiated political structure would lead to more disparate demands. These disparities were said to be the result of organizational position, professional training, and adherence to sub-group values and reference groups. Critical factors discussed included the history of social relationships, likes, dislikes, and organizational attachments of those involved in the demand-generating process, and the level of uncertainty surrounding the decision. This uncertainty was a product of a complex political structure, a technically complex set of problems, the dynamic nature of the technical environment in which the decision was being made, and the selective intervention of external forces. Many of these factors were found to be important in the case study reported here and will be raised again later in the thesis.

Organizational politics is necessarily tied up with a notion of power. Pettigrew, in his case study, refers to the necessity of mobilising sufficient power in support of a demand and that 'such a process of mobilisation is founded not only on the possession and control of system relevant resources but also on skillful use of them.' (Pettigrew 1973). In particular, he stresses the importance of information as a power resource and the role of the technical gatekeeper. The technical gatekeeper is located in such a position in the organizational structure as to be able to open and close the communication channels and to collect and manipulate information before it is passed on. An important factor in the mobilisation of

support for a demand is an individual's perception of the organizational power structure. However, Pettigrew goes on to point out that neither control of information nor accurate perception will be much use unless the individual has political access; so that through their structural position and inter-personal relationships they are able to approach potential supporters who are able to influence the effective decision-makers.

In his discussion of power, Pettigrew focuses mainly on information control as a power, resource as this was of particular interest in his case study. Bacharach and Lawler (1980) develop a much more complex typology of sources, bases and types of power. They begin by offering an explanation and solution to the confusion over the terms power, influence and authority. In contrast to other approaches (which either equate the three concepts, or equate power with influence and assert that authority is a special case of power) Bacharach and Lawler take the view that authority and influence are distinctly different dimensions of power, each with its own special properties. The unique aspect of authority is that subordinates acquiesce without question and the term implies involuntary submission, whilst when submitted to influence the subject does not suspend his critical facilities or willingness to act on the basis of his own inclinations.

After clarifying the concepts of authority and influence, Bacharach and Lawler (1980) go on to make a distinction between the bases and sources of power. Bases of power refer to what the parties control in order to be able to

have power over others and sources of power refer to how the parties come to control the bases of power. They identify three primary bases of power: coercive, resting on the threat of physical sanctions; remunerative, based on the control of material rewards and normative, based on the control of symbolic rewards. In addition to these, Bacharach and Lawler include a knowledge or information power base similar to that held by the technical gatekeeper in Pettigrew's work.

Finally, Bacharach and Lawler identify four sources of power. First, the structural position may give an individual access to various bases of power, such as access to information or the ability to withdraw material rewards. A second source of power is personal characteristics, for example verbal skill allowing the individual to argue effectively for additional resources. Third, expertise is seen as being a source of power, such as education. It is not classed as a basis for power as it must be developed and applied to the organizational context before it can be of any use. Fourth, opportunity is classed as a *source of power embedded in the informal* structure of the organization, for example a Chairman's secretary has no official position of power but has the opportunity to regulate who has access to the Chairman and thereby influence the decision process. Bacharach and Lawler conclude that 'the distinction between authority and influence heightens our awareness of power in organizational settings and provides the starting point for a political analysis of organizations' (Bacharach and Lawler 1980).

This researcher was given considerable access to information and individuals within the case study company, making it possible to observe political activity similar to that noted by Pettigrew (1973). However, whereas Pettigrew observed only the decision process from the narrow viewpoint of the computer department, this researcher traced the whole process of introducing new technology and took into consideration the various viewpoints of the many different departments concerned. The existence of power and politics within the organization will be illustrated later in the thesis and analysed in terms of the typology devised by Bacharach and Lawler.

SUMMARY

The review of literature on new technology at the beginning of the chapter highlighted a number of deficiencies concerning content and presentation. With regard to content, whilst the bias towards technical literature has largely been overcome, much of the work now tends to focus heavily on industrial relations issues and the impact of introducing new technology rather than the process by which it is achieved. The presentation of the work is rather normative and fails to represent and analyse what actually takes place in organizations. In addition, many of the publications result from the proceedings of a conference and therefore fail to develop a consistent argument and a sound theoretical base on which to build.

In contrast to these approaches, this thesis describes what actually happened two case study companies and the introduction of new technology is seen as a dynamic process. The focus of the study is on interactions between individuals and departments at managerial level and the implications these had for the strategy to introduce new technology. Within the case study companies issues such as environment, organizational structure, internal power and politics were found to influence the introduction of new technology. Therefore, in order to achieve a greater understanding of these concepts, the researcher referred to the literature on organizational behaviour. The most relevant works, which provided the initial theoretical base for the research, are outlined in this chapter to provide an introduction to the concepts and terminology which is used throughout the thesis.

PART II

Part I provided the background to the study in terms of the retail grocery trades, the main case study company, the methodology and the relevant literature. Part II will explain and anlayse the introduction of new technology into Laws Stores over a three year period, January 1982 - December 1984, and draw comparisons with the second case study company, Wm Low.

Part II consists of five chapters, plus the conclusions. Chapter 7 examines in detail the events that took place during the introduction of the head office computer and in-store sytems into Laws Stores. Chapter 8 analyses these events in terms of the strategy to introduce new technology and the processes involved in forming and implementing that strategy. Chapter 9 investigates the underlying factors which gave rise to those processes. Chapter 10 presents the background to the comparative oraganization, Wm Low, focusing on its data processing devlopments. Chapter 11 draws comparisons between Wm Low and Laws Stores in terms of history, structure and, in particular, their differing attitudes to new technology. Finally, the conclusions summarise the findings of the thesis, analyse its contribution to the existing body of knowledge on new technology and discuss the implications for future research in the area.

7. THE INTRODUCTION OF NEW TECHNOLOGY INTO LAWS STORES

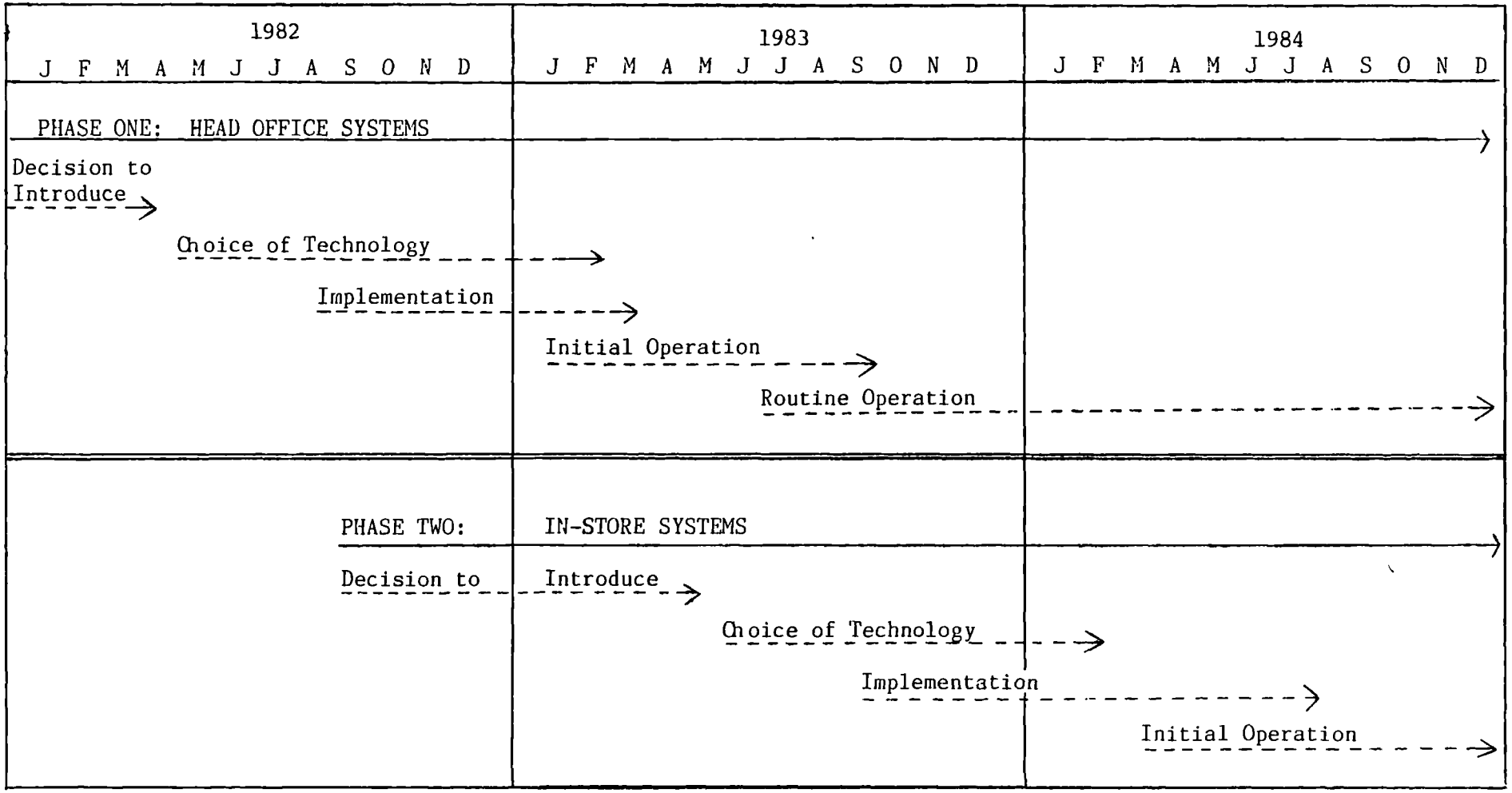
The introduction of new technology into an organization is not a single discrete event but is composed of several different stages. Wroe (1986) identified 3 stages: the selection stage; the implementation stage and the live operation stage. Wilkinson (1983) also noted three stages: design; choice; implementation and debugging. McLoughlin et al (1985) noted five stages: the decision to introduce; the choice and design of technology; implementation; initial operation and routine operation.

In contrast to the approaches above, the rapid developments which took place at Laws Stores were more complex. Therefore, the events are divided initially into two phases: first, the introduction of head office systems and second, the introduction of in-store systems. Each phase is then further sub-divided into different stages using McLoulghlin's categorisation (Figure 7.1). This categorisation was found to be most appropriate because of its more detailed stages and their greater applicability.

The first phase (see Appendix I) extends from January 1982 to September 1983. It began with the initial proposal and decision to computerise, the choice of equipment and establishment of the Data Processing Department. This is followed by the subsequent implementation and initial operation of head office and warehouse systems. During this period, investigations were also taking place into in-store systems such as laser scanning and Portable Data

The Introduction of New Technology Into Laws Stores Ltd : Phases One and Two

Figure 7.1



Capture (PDC) units, but the major emphasis was on head office systems. The research into this period was retrospective, based on documentary evidence and interviews with those who were involved.

The second phase, (See Appendix J) beginning in October 1983, marks the shift in emphasis from head office to shop systems. Most of the former were now into the routine operation stage, although they were still being enhanced. But the most significant developments were taking place in the stores. During this phase, PDCs were gradually being introduced into all branches and laser scanning was installed in two branches on a trial basis. This period ended in December 1984.

It is important to emphasise that these divisions into stages and phases are for analytical purposes only. The detailed chronological tables in Appendices I and J shows that, in reality, the introduction of new technology did not consist of such logical sequential steps. As will be shown, the process was an iterative one (Johnson and Scholes 1984). The introduction of new technology into Laws Stores demonstrates that as the strategy evolved, it was sometimes necessary to return to a previous stage to reformulate a decision or choice.

Similarly, the introduction of new technology did not consist of one single component, 'the technology', such as a piece of hardware or software. It consisted of a multitude of components: hardware such as central processing units, disk drives, terminals and printers; and

software such as operating programmes and a variety of application programmes, for example personnel, payroll, purchasing, financial accounting, and text processing. Each of these components or systems was progressively introduced over a period of time. For example, after the basic hardware has been installed the financial systems were implemented and undergoing initial operation and testing whilst other systems, such as personnel or text processing were designed and developed. These were then implemented at a later stage whilst the in-store systems were being investigated. Thus it is difficult, when analysing extensive technological change, to divide the multifarious process up into clearly identifiable, discrete phases and stages because of the overlap of the different components.

Although writers argue over the precise nature of the impact of technological change, most agree that its effect on an organization can be dramatic, stressful and even revolutionary (Pettigrew 1973, Bessant and Dickson 1982, Long 1984, Rowe 1986). The experience of Laws Stores, which progressed from no in-house data processing facilities to laser scanning in two years, was no exception. This chapter analyses this progression and the problems which arose.

Phase One: Head Office Systems

THE DECISION TO INTRODUCE

The origins of the computer proposal, submitted in January 1982, stemmed from the appointment of a new Finance Director five months earlier. He saw the finanacial systems that were currently in operation as antiquated and unacceptable and began to investigate the possibility of introducing a computer for accounting procedures. With the Chairman's approval, and without objections from other directors, the Finance Director also investigated other areas of the company and found that they too were out-dated, being paper-based and labour intensive. He felt that the bureau currently being used for the company's data processing requirements was becoming increasingly expensive relative to the falling costs of computers and software. In addition, the bureau operation was hampering the development of new systems within the company.

As a result of his investigations the Finance Director prepared a proposal, outlining the concept of computerisation and the associated costs and benefits. When this was presented to the Board there was some controversy, mainly because of the high investment that would be required. Although the other directors regarded it with suspicion, the Chairman was fully in favour of the proposal. Thus, according to the Finance Director, 'there was really no direct opposition to the proposal because

once the Chairman makes up his mind there is a general unspoken consensus amongst the others to follow his decision'. The computer proposal was therefore passed by the Board. At this stage few people in the company had any experience or knowledge of computerisation. As a result of subsequent events and discussions with those involved, it later became later clear that no-one other than the Finance Director realised the extensive changes that were about to occur and the implications these changes would have for the organization.

THE CHOICE OF TECHNOLOGY

After reviewing a number of computer suppliers (for example ICL, DEC and NCR) IBM were chosen. The reasons for this choice included IBM's reputation as a successful company and their reliability. This was in line with a company decision 'not to pioneer', but to use a reputable company, as it was felt that this would minimise the risks involved. In addition, IBM had software available that would fulfill Laws' requirements and they would provide training and support. A further reason for the choice, and perhaps the most important, was the Finance Director's previous experience of IBM equipment.

It was originally intended to purchase an IBM 4300, but this decision was delayed and the System 38 was eventually chosen. Various reasons were given for the delay. According to the Finance Director, it was the result of developments at IBM. They were currently enhancing the System 38 and, as this would be more suitable for Laws'

requirements, installation was delayed until it was ready. However, according to the Chairman, the introduction of the computer was delayed until September at his instruction, as he felt that the systems would not be ready by April, the original date set. Thus, in his opinion, the fact that this delay enabled the company to introduce the 'state of the art' technology was merely a fortuitous turn of events. Whatever the reason, the System 38 was eventually chosen after some discussion and was later agreed by all those involved (such as the Chairman, Finance Director and Data Processing Manager) to be a suitable choice. It met the company's requirements in terms of cost, size, maintainance and staffing requirements.

Recruitment. Having agreed to the proposal and decided on the supplier, the next step was to recruit staff. In April the existing Company Accountant was appointed Project Manager with responsibility for implementing the financial systems. A Data Processing (DP) Manager was appointed in May and a data processing team was recruited consisting of an Operations Manager and three Analyst Programmers. Given the small size of the DP department, it was neccessary for the user departments to undertake some responsibility for the development of the systems. Individuals were therefore chosen to act as representatives for their departments. According to the Finance Director the user representatives chosen were either the most senior members of the department or the one who would ultimately have responsibility for the system. A different view was taken by the Data Processing Manager

who saw the choice of user represntative as 'the one who drew the short straw'.

Software. By May, five months after the proposal was submitted, almost all the software packages had been chosen by the Finance Director. Minutes of the Executive Meeting of the 6 May 1982 state,

> 'Packages fairly well identified apart from payroll and personnel. IBM did not at present have a personnel package but (the Finance Director) thought it would not be long before they did. Agreed that personnel was not one of the top priorities.
>
> Programmes to be established with DP people and users. In about 4/5 weeks there would be substantial involvement with users to define present systems and requirements from packages.'

It is interesting to note from this memo that it was six months after submission of the proposal and four to five weeks after identification of packages that the users became involved. For a variety of reasons (which will be discussed later) the users were not involved in the choice of software packages for their departments. The implications of this will become apparant later in the chapter.

IMPLEMENTATION

In August 1982 the majority of the computer hardware and operating programmes were installed. A memo of 20 August 1982 from the Finance Director states,

> 'The IBM System 38 mainframe computer has been successfully installed in Head Office with all its operating programs. The first stages of the work to introduce the financial accounting systems is well advanced, the actual applications program has been set up and is due for final testing on 24th August. Work is also fairly well advanced on a new chart of accounts, and the various input documents necessary to set it up on the computer installation. I would anticipate that the chart of accounts approval by the persons involved would be during week commencing 23rd August. The anticipated first run date when input will be live on the System 38 is still scheduled as 24th September. Work has also begun on the payroll systems and we are about to commence work on the warehouse and DIDOS systems. We anticipate that the original project plans will be met with all our basic systems in operation by the end of the current financial year. There would then be a period of three or four months of necessary refinements.'

Gradually over the next few months additional hardware, such as processing boards, VDUs and printers were introduced and the software packages were developed and tailored to the company's needs.

Education and Training. It was also neccessary during this time to undertake training at all levels of the organization to prepare members for the changes that would take place. According to the Finance Director,

> 'The education process took three to four months, it was a 'them and us' situation. We had to convince the users. It probably took four to five months for them to acknowledge the new systems. In certain cases the Director did not get involved. We arranged "user visits" in this country and on the continent for the appropriate manager and director, but this failed to convince them, there was just total lack of commitment'.

As the company's two training officers were mainly responsible for the branches, training on the new head office and warehouse computer systems was undertaken by the DP department. The Analyst Programmer assigned to each particular application trained the user representative who then passed on the skills and knowledge to the rest of the department.

The Finance Director and Data Processing Manager arranged more general meetings for employees prior to the introduction of computers to explain what problems might be likely to occur and to provide an opportunity to ask questions. However, by their own admission this was not entirely successful, the Data Processing Manager reported 'it later turned out that this hadn't worked, people had not understood but had been reluctant to ask questions'.

In particular the users did not appreciate the speed at which change would take place and how much their involvement and commitment was required. According to the Finance Director,

> 'nobody understood this, no matter how many times they were told. They still did not realise it when we went live. This was one of the problems and caused opposition from users, despite training sessions, they did not tell us what they wanted and did not participate'.

At a more senior level, education for directors took the form of visits to IBM, either in Britain or abroad, to see the systems in operation. Also, all directors went on a residential two-day course organized by IBM, 'the objective being to outline the company's future plans and how they will be affected and assisted by DP'.

By December 1982 the first of the systems, payroll and the nominal ledger, were in operation, the accounts for that period being produced entirely on the computer. Whilst some applications were in the 'initial operation stage' (McLoughlin et al 1985), others had only just been identified as suitable. Despite having been seen initially as a low priority, a personnel package was purchased and the in-putting of data begun. Some difficulty was encountered in identifying a suitable purchasing package but after several visits to IBM, including their office in Milan, and after a great deal of discussion, the IBM IMPROVE system was chosen. A report by the Finance Director underlined the importance of this system and anticipated future problems, 'this is the most

difficult application and cannot be achieved without full co-operation of all concerned'.

By January 1983, one year after the initial proposal, all packages had been installed and were at various stages of development: financial accounts; payroll; warehouse; text processing; purchase ledger; nominal ledger; purchasing and personnel. Rapid development took place in order to have all systems operational by April. The month of March was particularly important, a report by the Finance Director on 31 March states,

> 'this week is a critical time for Laws' internal management information systems as it is the last week we will be operating on the bureau. At the end of week 52 the bureau will run off our normal month-end and year-end reports and we will thereafter no longer be utilising their services'.

INITIAL OPERATION

To many people's surprise the changeover during the first week of April was successful,

> 'On day one, 1 April 1983, the systems worked 95%, much to my surprise because I only expected them to work 75%. The first week was semi-chaos, but then we were able to build on that' - Data Processing Manager.

> 'The initial operation went very smoothly, the hardware was very straightforward. The payroll

went on smoothly and the accounts fairly smooth' - Chairman.

'The introduction of new technology went very smoothly, more so than expected, there was a great amount of learning took place which was very satisfying. There was much less dissention than expected. Although there were some who had no concept of reality and expected everything to go smoothly from day one' - Operations Director.

Although the systems were now operational, development continued to further refine the systems, adapt them to user requirements and increase their capabilities. Whilst superficially it appeared that the introduction of new technology had been a complete success, it subsequently emerged that this was not entirely true. An indication of the problems was given in interviews with the users most closely involved with systems implementation.

One area of dissatisfaction centred on the provision of information. Apart form the initial meeting when the staff were first told about the introduction of the computer, no other formal communication took place and the staff were not consulted. Information obtained through informal channels was confusing and ususally incorrect. For example, members of some departments were assured that no changes would take place concerning the information generated by the system or the format in which it was produced. Both of which were subsequently found to be untrue.

Another controversial issue was the level of staffing. The wages department was given a two week time limit to input the data into the system and check that it was correct, whilst still maintaining the old system. This was undertaken with the same number of staff, although other departments in similar situations had extra help. There was no parallel run of the system which immediately went 'live', putting severe strain on the departmental supervisor. The supervisor felt that she had unfairly been given total responsibility for the system and there was a lack of concern on the part of management.

The suggestion that the changeover had been problematic was confirmed by the decision not to proceed with laser scanning in the autumn of 1983 as planned. The Chairman issued a memo on 24 August 1983 suggesting that the company defer scanning until January or February of the following year, 'I believe the Board should now give the most serious consideration to extricating the company, if at all possible, from any commitment to go live with scanning at two branches this autumn'. Three particular areas were of concern to the Chairman:

> '1. that we have been "flying blind" for longer than is good for us particularly in respect of the analysis of charged profit. This makes it impossible to assess the current financial performance of the business or to determine the consequences of current pricing and merchandising decisions.

2. following the reversion to manual completion of the branch stock ledger confidence in branch stock results is being rapidly eroded.....

3. the Buying Department is handicapped in a number of important ways by inadequacies (compared with the previous regime) in the different systems on which they depend and their interfaces'.

According to the Chairman these problems were currently placing a heavy burden on the DP department and the organization in general. In addition the development of PDCs would further stretch resources and would require changes in working practices. Therefore, the Chairman felt that to embark on scanning at this stage would increase risk and stretch the organization's capabilities still further. Replying in a later memo, the Financial Director agreed with the proposal put forward by the Chairman and it was decide to defer scanning until the following January or February.

Phase Two: In-Store Systems

The introduction of laser scanning is arguably the most significant change in food retailing since the move from corner shops to supermarkets. Most retail chains have introduced new technology gradually, beginning with large central mainframe computers in the 1960s, using portable data capture units in the 1970s, and experimenting with laser scanning in the early 1980s. Whilst this took most

companies over twenty years, Laws Stores attempted to make the transition in less than two.

As demonstrated in the previous section, the head office computer was installed in August 1982, the use of PDCs began in September 1983, and by the end of June 1984 the company had two stores operating laser scanning. This section will deal with the latter part of this transition, the introduction of in-store systems commencing in August 1983. It examines both PDCs and laser scanning, from the decision to introduce, through choice of technology and implementation to the initial operation.

THE DECISION TO INTRODUCE PDC UNITS

Little documentary evidence could be found relating to PDCs. A memo by the Finance Director entitled 'Future DP Developments', dated 25 March 1983, includes a section on the hardware and software required for PDC installation,

> 'Phase 1 - Pilot system at one local store .....to prove the system. The pilot will by use of PDC replace the filling of the current shop order form transmitting the base order (code and quantity) via GPO lines to the System 38. Initial system will be key entry from simple shelf-edge label (current commodity code and description)'.

No written justification or reasons for the introduction of PDCs could be traced. Interviews with respondents revealed the main reasons as being: reducing the time spent ordering in the shops; reducing the order lead time

and reducing the number of data input staff at head office.

THE CHOICE OF PDC UNITS

MSI were chosen as the supplier of PDC equipment to Laws Stores. No documentation was found outlining the reasons or criteria for this choice. In discussions it was suggested that, at the time, they were the only supplier. Investigations by the researcher showed this was not the case. One of the leading consultancies in retail technology list seven suppliers with a total of thirty different models (RMDP 1982). They also note that,

> 'MSI Data International claim to be the world's largest supplier of hand-held terminals with some 200,000 units installed worldwide. They have been selling portable terminals on the UK for 16 years and their installed base in this country is 4000 units. The majority of these (about 85%) are in retail environments'.

Therefore it is likely, as the most prominent supplier of retail data capture systems, *that MSI were the obvious* choice for Laws Stores and offered the most comprehensive and suitable package in terms of hardware, software and cost requirements.

A systems analysis was carried out by a member of the DP staff and the Work Study Officer to ascertain the best method of operating PDCs in the stores and the software was tailor-made by an outside agency to the company's requirements.

IMPLEMENTATION OF PDC UNITS

Implementation of PDCs began with training at a trial store in August 1983. This initial training was undertaken by a member of the DP Department who also wrote the user manual. The operation of the PDC was quite simple but required careful attention to detail, particularly when transmitting the data back to head office. The procedure involved taking the unit around the store noting which stocks were low and keying in the order. The computer room at head office was then telephoned to inform them that the order was ready for transmission. The unit was plugged into the telephone and a sequence of buttons pushed in the store and at head office. Once the telephone receiver was replaced the order took approximately three minutes to transmit.

The first trials, undertaken in a store in September, highlighted a number of problems. In particular, additional procedures were required to deal with stocks held in the warehouse and for orders in transit. The resulting operational changes that were necessary included continuing to write out the order manually. This provided the store with a record of the order in transit to enable it to place the following day's order. This duplication of work reduced the benefits that would accrue in-store - a point which was raised by the Work Study Officer. However, this objection was disregarded by the DP Department because of the cost required to build such contingencies into the PDC system.

When questioned about the use of PDCs, many branch managers expressed a fairly ambivalent attitude. They did not have total confidence in the new ordering system because of the failures in the initial stages. According to one store manager 'the PDCs were OK but the equipment was a bit of a headache', and another reported that, 'we still have to write the orders out, so the only benefit is the shorter lead time'. Whilst recognising that there was reduction in head office data input staff, as far as they were concerned it was an expensive piece of equipment which only reduced the order lead time by a day and saved the cost of a first class stamp.

After these initial difficulties had been overcome, the Finance Director outlined the future plans in a memo at the end of October, 'PDC units - Further 20 stores..... The introduction of a second site and the completion of an operational package to allow "trainers" to carry out further implementations'. This implementation process began in January 1984 and was staggered over a period of several months with an average of three stores coming on-line each week. The majority of the branches were trained by the Training Officer, who was also present at the three test transmissions and the first 'live' transmission.

INITIAL OPERATION OF PDC'S

The researcher spent two days in the computer room at head office, observing the orders being received by the System 38. In addition, the computer operators recorded all the

PDC failures and their reasons for a six week period (see Appendix K). Through these methods, and interviews with branch managers, it became clear that the implementation of PDCs had not been without problems. Over the six week period, 60 orders had failed to transmit on the first attempt. (This is probably a conservative estimate as it is likely that the operators failed to note some incidents.) Most of these required three or four attempts before being successful. On two occasions the transmission failed completely. In one such case the Computer Operations Manager went to the store, in the other the branch manager took his PDC to another store for transmission.

The majority of reasons given for failures to transmit were related to difficulties with the telephone lines. Whilst according to the DP Manager this is unnavoidable, it is nevertheless frustrating and time consuming for the store manager. On one occasion a store manager, suspecting that his PDC unit was at fault, took the batteries out and lost all his data, causing an additional two hours work.

During the implementation process, after the first PDCs had gone 'live', a situation arose which the Chairman later referred to as 'tragic'. A number of PDCs failed frequently and the reason could not be traced. The DP Department attributed this to operator error and blamed the branch managers and the Training Officer. They cited an example of a manager not replacing the telephone receiver to allow transmission to take place. The

Training Officer pointed out that this manager had in fact been trained by the DP Department. The fault was finally traced to an error in the PDC's software which caused it to malfunction when a certain sequence of operations was carried out. To rectify this all PDCs had to be withdrawn and returned to the suppliers for reprogramming of the microchips.

After the difficulties with the initial operation of the PDCs their reliability improved and they entered the routine operation stage. At head office investigations continued to further improve their capabilities. This included the possibility of providing links direct to the distributors for ordering fruit and vegetables, chilled and frozen goods.

THE DECISION TO INTRODUCE LASER SCANNING

The initial computerisation proposal had included provision for laser scanning at a later date. According to the DP Manager it had previously been decided that 'until a strategy was agreed' no more conventional checkouts would be introduced. Instead, when they needed replacing, modular checkouts would be used, supplied by a German manufacturer, Portrafke. These 'ergonomically designed checkouts' were found to give an increase in productivity and could later be used to house the laser scanning tills.

When laser scanning was formally proposed, in a paper written by the Finance Director dated 20 August 1982, it

was seen by him as a natural progression of the technological developments. This paper devoted a page to 'Competitive Activity', describing the plans for laser scanning of other regional supermarket chains. This emphasis on competitor's intentions can be compared to only five lines of the paper devoted to the likely benefits to accrue from laser scanning.

> 'there are special benefits in both costs, reducing staffing levels within supermarkets by eliminating price marking of individual products, the removal of checkout errors and the provision of substantial sales information for both marketing and re-order purposes'.

This suggests that competitors' activity was an important factor in the decision to introduce laser scanning. This was also supported by evidence from interviews:

> 'the Finance Director and the Data Processing Manager wanted to be out in front. They felt that if the number of laser scanning installations increased dramatically we would be at a sharp competitive disadvantage' - Chairman.

> 'laser scanning is great fun, its just a race to get there first' - Operations Director.

> 'it was decided to introduce laser scanning mainly because others were into it and therefore it should be investigated' - DP Manager.

At the time the proposal was submitted, according to information gained by the Finance Director, none of the

company's immediate competitors, ie those operating in the same region, had installed laser scanning, but many were involved in negotiations with suppliers.

The Finance Director presented the paper to the Board meeting on 26 August 1982. He recommended that two stores should be installed with scanning, the first in August /September 1983, and the second in September/October. He reiterated the comments made earlier, 'we would also be in a position to keep up with the plans of competitors in that a number of the stores are planning installations towards the end of September/October'. The minutes of the meeting show that 'after discussion agreement was given to the proposals therein subject to arrangements on location'.

CHOICE OF LASER SCANNING EQUIPMENT

As discussed in Chapter 2 there is wide variety of EPOS equipment available to cater for every type and size of retail outlet. In 1982 there were 11 different suppliers in the UK scanning market alone, with 14 different systems available (RMDP 1982). Configurations vary depending on the degree of sophistication required and whether data processing and analysis is to take place centrally or in-store. The type of equipment required by Laws was at the simplest and cheapest end of the range because of the small size of the branches and the limited funds available.

The DP Manager outlined the criteria laid down by himself and the Finance Director for the choice of equipment:

1. It must fit into the Portrafke checkouts.
2. It must be modular.
3. It must be able to run a simple price-look-up system on a stand alone basis.
4. It must be capable of upgrading to laser scanning at little cost.
5. It must be a master/slave configuration.
6. It must be capable of communicating to the System 38.

According to the Finance Director's paper of 20 August 1982,

> 'During the last six months, contact has been made with a number of electronic point of sale equipment manufacturers, to determine the type of equipment and systems we should eventually install. We are now at the stage of recommending that we use equipment from two suppliers, namely: Anker Data Systems; NCR Limited.
>
> We have come to the conclusion after examining in detail equipment from IBM, Data Terminal Systems, ICL Limited and Sweda. The equipment from Sweda and ICL has been discounted on the basis that neither the equipment nor the operating systems are currently available. Both these suppliers have plans and prototypes but no working equipment is available except at their

development centres. Prices, similarly, are not available'.

The final decision in favour of ADS and NCR was based mainly on lower costs. The NCR deal was particularly favourable, subject to conditions that it was accepted before 31 August and that potential customers would be able to view the equipment in operation at Laws Stores. Both types of equipment were basically the same, using a master/slave configuration (Figure 7.2), with some minor differences in their systems capabilities. Initially it had been intended to test both types of equipment in the trial stores and then choose one to be extended to other branches. However, according to the DP Manager, benefits were found from playing the two suppliers off against each other, and so it was decided to continue with both.

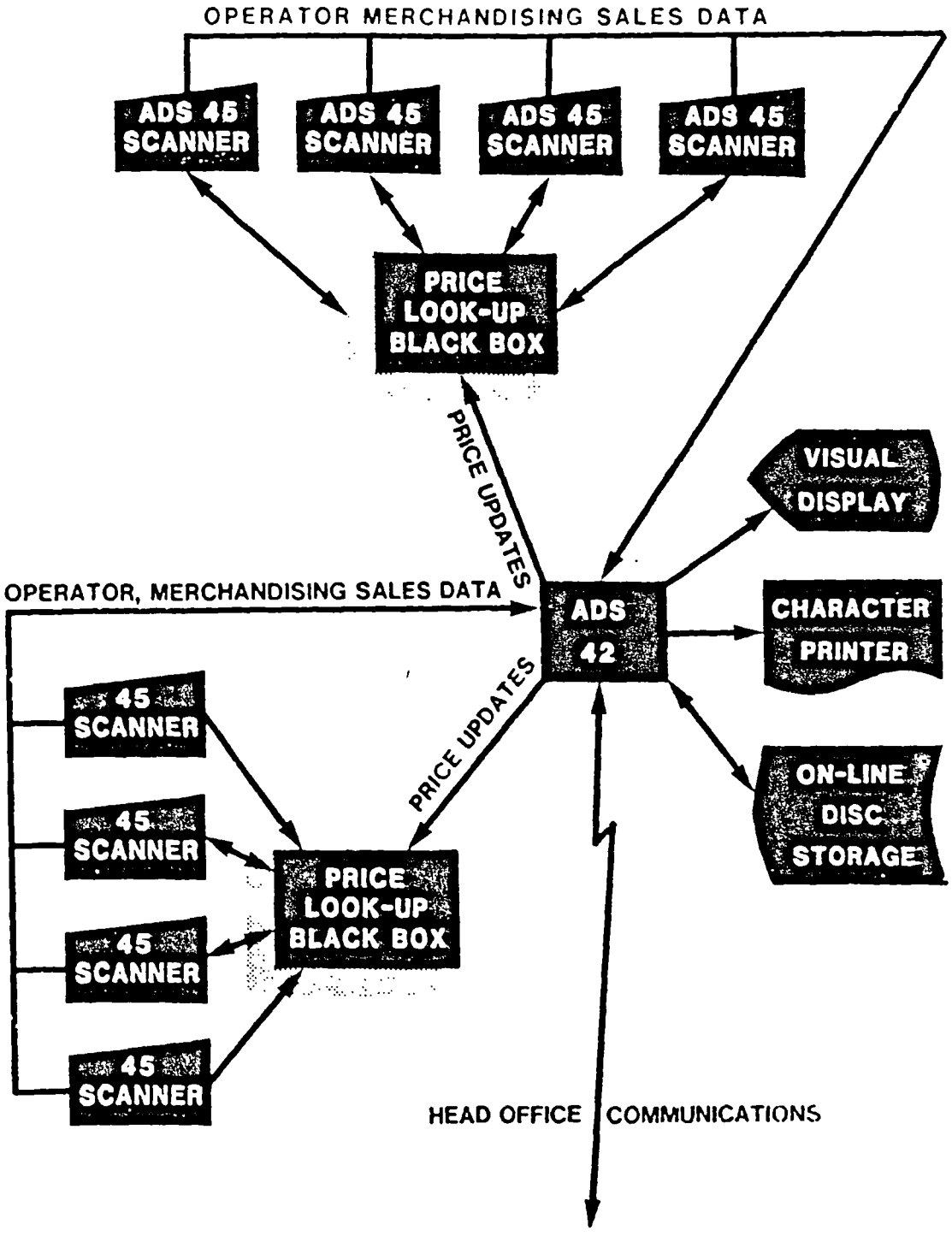
IMPLEMENTATION OF LASER SCANNING

The company introduced its first trial laser scanning store in March 1984, utilising ADS equipment. This was followed by a second trial store, utilising NCR equipment, in June of that year. The extensive developments taking place at head office were already stretching the resources of the small data processing team. Therefore, the DP Manager undertook responsibility for laser scanning himself.

When the laser scanning proposal was passed by the Board, decisions were taken regarding which stores would be used for the trials and when it would be introduced (although

ADS 45/42 Master/Slave Configuration

Figure 7:2



Source: RMDP (1982)

this was subsequently delayed). No guidance was given by the directors on how this should be done or the objectives to be achieved. Therefore, decisions concerning the implementation strategy for laser scanning were left to the discretion of the managers concerned: the DP Manager; the Area Manager and the Store Manager. Some weeks prior to the installation of laser scanning in the first store a series of meetings were held between these three managers to discuss how this would be done. Although some consultation took place, the researcher formed the opinion, from observation of these meetings and interviews with participants, that in reality all decisions were taken by the DP Manager. According to the Store Manager, '..... (the DP Manager) would always let you have your say, he may not do anything about it, but at least you'd made your point'.

The reasons for the DP Manager's greater power largely relate to the question of perceived status. Formally, as represented by the organization chart and company cars, the DP Manager and Area Manager were of equal status, but in reality the DP Manager was perceived as having higher status. This was partly because he reported direct to the Board and partly because of his perceived greater specialist knowledge. There was always a mystique surrounding computerisation which it was felt the users could not understand. On the other hand, it was thought that the DP specialist did not have any difficulty understanding retail operations. The status of the DP Manager and his associated power was identified as a key

issue in the introduction of in-store systems and will be discussed in greater detail in Chapter 8.

A provisional date was set to go 'live' with scanning on 26 March 1984. It was decided that the Store Manager would be responsible for the implementation and that he would personally carry out all the preparations. In the Store Manager's own words, 'I didn't mind doing it if everyone was aware of the fact and if I got additional assistance to run the store'. A Trainee Manager was assigned to assist the Deputy in the daily running of the branch whilst the Store Manager proceeded with preparations for the change-over.

The Chairman visited the store three weeks prior to the live date and was not satisfied with this situation. He felt that the Store Manager's priority should be the smooth operation of the whole branch rather than the details of new technology. The Operations Director was reprimanded for not controlling the situation and the Personnel Director was brought in to oversee future events. A meeting was held between the Operations Director, Personnel Director, DP Manager, Area Manager and Store Manager to discuss the matter. But according to the Personnel Director, 'those three had already had a meeting, made their excuses and had covered their backs'. He went on to say, 'they've lied once and they'll do it again, they may have pulled the wool over our eyes this time but we'll be more wary of them next time'.

The enforced involvement of the Personnel Director at this late stage introduced an element of conflict into the implementation process. This can be illustrated by a quote from the Store Manager, 'he was told by the Chairman to become involved and then started sticking his nose in half way through and saying the wrong things'. Further evidence showed that the other participants, the DP Manager, Area Manager and Store Manager resented the fact that the Personnel Director came in half way through the implementation process and imposed his ideas on them without fully understanding the situation.

Other factors contributed to the friction. Animosity had always existed between the Personnel Director and the Finance Director, as the DP Manager was part of the Finance Department the conflict overflowed into this relationship. It was generally felt that the Personnel Director was against new technology and therefore prejudiced his chances of being seen as a neutral observer and gaining acceptance for his ideas. The conflict between the Personnel Director and the other participants, primarily the DP Manager, surfaced frequently and marred the whole project.

INITIAL OPERATION OF LASER SCANNING

Although the date set for the changeover had originally been provisional, it was taken to be definite by other members of the organization, in particular the Chairman. Therefore, live operation of the laser scanning equipment began on Monday 26 March 1984 as planned. Considerable

work had been necessary on the previous weekend in order to meet this deadline. The initial operation did not appear to experience any major difficulties. In interviews, respondents differed in their views on how successful the project had been. According to the Area Manager it went 'very smoothly' but the Personnel Director felt it was 'inefficient from start to finish'.

These differences of opinion arose again over the appraisal of the benefits to be gained from laser scanning. On 4 April the Chairman wrote a memo noting that 'at this stage I think it is useful to look again at the list of advantages claimed for scanning and consider how far we can exploit them'. At the next Board meeting the tasks for appraising the various benefits were assigned to the appropriate directors. For example, the evaluation of customer satisfaction was assigned to the Buying and Marketing Director and routine re-ordering to the Operations Director. However, no action appeared to be taken on any of these matters apart from the evaluation of checkout speed which was assigned to the Personnel Director. As was noted in Chapter 2 this had been the subject of many previous studies outside the company, the results of which had been contradictory.

The Personnel Director conducted his investigation by timing individual operators in the laser scanning store with a stopwatch and comparing these figures with those from a conventional store. He concluded that, as a result of laser scanning, checkout productivity decreased, at least initially, by 40%. The DP Manager disputed this

figure, and in particular the way in which it had been achieved.

There then followed a series of memos (9 in all) between the Personnel Director and the DP Manager over a period of a month, each trying to put his case across. Copies were also circulated to the Chairman and Operations Director in an attempt to influence their views. Eventually, a meeting was held between the Operations Director, the Personnel Director and the DP Manager at which the issue of checkout productivity was 'thrashed out'. Although the matter was not totally resolved, a compromise was reached involving the installation of an extra checkout in the second store, prior to the introduction of laser scanning. It was also agreed that further monitoring of checkout productivity would continue in both stores. The DP Manager, however, did not believe this task was his responsibility, so it was left to the Personnel Director.

The equipment in use in the second store automatically produced information on checkout productivity, both per operator per day and aggregated figures for all operators for the total week. This information was sent weekly to the DP Manager, but neither he nor the Area Manager notified the Personnel Director of its existence. According to the Area Manager 'some of the tills give information on individual operators, but I wouldn't want everyone to know that'. The Personnel Director, therefore, continued calculating individual operator results to achieve a weekly average. He collected the data until he felt he had sufficient information to prove

his point. According to his figures, productivity did improve somewhat as the operators became more practised. It did not, however, rise above the previous levels of the conventional checkout as had been claimed.

From the point of view of the individual checkout assistant laser scanning entered the 'routine operation' stage as they became more proficient with the necessary till procedures. To a certain extent this was also true at the individual store level where the new routine became part of the normal working day. At head office, however, laser scanning was not considered routine. It was still only installed in two stores on a trial basis, and investigations continued into ways of enhancing its capabilities. For example a barcoding gun was tested in the first store over a three week period. Also, the use of barcoding scales was investigated.

During this time, June 1984, the Finance Director resigned. As he was not replaced, some changes were necessary to the organization structure. These included bringing the DP Department under the supervision of the Operations Director. Thus giving even greater control to family members (see the organization charts in Chapter 4) and reinforcing the trend towards computerising in-store systems.

As the debate continued various reports were written to try and prove the viability or otherwise of introducing laser scanning into more stores. In a report written in September 1984, entitled 'A Summary of Scanning at Laws

Stores', the Data Processing Manager outlined what he saw as the choices available to the company:

'OPTIONS AVAILABLE FOR LAWS

A number of practical alternatives are available to us now we have six months scanning experience at Laws.

1. Keeping our two pilots stand alone - review again in 12 months time.
2. Keep two pilots link one to System 38 - review again in 12 months time.
3. Extend scanning on a stand alone basis to those stores that can justify it, each case being judged on merit. Provide the link when sufficient stores are scanning to justify the cost.
4. Extend scanning as in (3) but review the alternative to a HO link (eg micros in-store).
5. Abandon the scanning route for the foreseeable future.

RECOMMENDATIONS

My own view is that we should continue with current company policy, where new stores or total front end changes are necessary, to install modular tills and Portrafke type check-outs and then to take Option 4 as previously defined'.

The Chairman replied with a paper which again outlined the potential benefits of laser scanning and the alternatives as he saw them (these were similar to those of the DP Manager but expressed rather differently). He also noted that 'we do not yet have a comprehensive evaluation of costs and benefits'.

As indicated by the above comments of the Chairman and the responses of those interviewed, it appeared that the appraisal of benefits was continuing. Further papers were written commenting on the benefits to the existing stores and the choices available. No new information was produced and no decision taken on the future of laser scanning within the company. Nevertheless, a list of DP Developments produced by the DP Manager in November indicted that he was proceeding on the basis of his recommendation, 'work has started on gathering information on hard benefits that would accrue from scanning in two of our stores. This is with a view to proposing an upgrade in the first quarter of 1985'.

The DP Manager produced a report in December 1984 outlining in greater detail the laser scanning system he envisaged using an in-store micro. He proposed that 'the next step is to meet early in the New Year to agree the way forward'. That meeting never took place. On 27 December 1984, when the staff returned from their Christmas break, the Chairman announced that the company was to be sold to Wm Low & Company PLC of Dundee. The takeover and the implications this had for the

technological developments, will be discussed in Chapter 10.

SUMMARY

This chapter has demonstrated the rapid devlopments that took place in Laws Stores over a three year period, beginning with the computer proposal in January 1982, through to the routine operation of laser scanning at the end of 1984. Whilst initially the introduction of head office systems appeared to go smoothly, it later emerged that problems had occurred during the implementation process. The introduction of in-store systems was similarly problematic, particularly as the users had begun to question the decisions of the specialists. The problems stemmed from the organizational processes involved in bringing about the change, such as lack of commitment, conflict and the use of power and politics. The way in which these processes influenced the strategy to introduce new technology will be discussed in the next chapter.

8. NEW TECHNOLOGY STRATEGY AND THE INFLUENCE OF ORGANIZATIONAL PROCESSES

The previous chapter discussed the introduction of head office and in-store systems into Laws Stores over a three year period. The aim of this chapter is two-fold: first, to examine the strategy by which the new technology was introduced; second, to identify the processes which influenced the formation and implementation of that strategy.

Chapter 7 raised important points with regard to new technology, strategy and organizational processes:

Technology
- the wide choice available both in terms of the technology itself and the ways in which it can be used;
- the uncertainty surrounding laser scanning and its potential benefits.

Strategy
- the absence of a clearly defined strategy or objectives for the new technology;
- the tendency of the functional managers to develop an implementation sub-strategy reflecting their own departmental interests.

Processes
- the intervening influence of organizational processes, such as politics, conflict and communication, through which the strategy is formulated and implemented.

TECHNOLOGY

Chapter 2 detailed the variety of new technology on the market. This present chapter serves to emphasise the wide choice that was available, both in terms of the technology itself and the way in which it could be used. In 1982 there was a choice of 11 laser scanning suppliers with 14 systems and 7 PDC suppliers with 30 different models.

Although a wide range of hardware existed this was not necessarily recognised by the Board. For example MSI were seen as the only supplier of PDC equipment. Also the choice of a laser scanning equipment supplier was limited to four because of the criteria laid down by the Finance Director and the DP Manager. This was also constrained by a previous decision taken by the Board - to proceed with modular, Portrafke checkouts until a strategy was agreed.

Similarly, the alternative methods of use for the technology were not fully realised. When designing the ordering system for use with the PDCs the computer specialists failed to take into account the benefits that might accrue in-store. Enhancements could have been built into the software to subtract the order in transit. This would not only have saved the store managers time but would also have encouraged greater commitment to the new technology. In the case of laser scanning the wide variety of benefits that might accrue were forgotten, as the debate centred on checkout productivity.

THE STRATEGY TO INTRODUCE HEAD OFFICE SYSTEMS

One definition of strategy which has frequently been used by other writers (Miles and Snow 1978, Robbins 1983) is taken from Chandler (1962),

> 'Strategy can be defined as the determination of the basic long-term goals and objectives of an enterprise, and the adoption of courses of action and the allocation of resources necessary for carrying out these goals'.

An analysis of documents was undertaken at Laws Stores to ascertain the company's strategy to introduce new technolgy. In Chandler's terms, this was the objectives to be achieved and the necessary courses of action. No statement could be found outlining the company's strategy at the time the computer proposal was accepted or prior to its installation.

A limited number of references (ten) to plans, policies and objectives were found in documents subsequent to the installation of the computer. The first of these was in a memo issued by the Data Processing Manager relating to a course being held for the directors, 'The course is designed as a first stage Planning and Policy Instrument. The objective being to outline the Company future plans, and how they will be affected and assisted by Data Processing'. Once again no documentary evidence could be found showing the outcome of this course or stating the company's policies and plans. The only explicit reference to a new technology strategy was made by the Chairman in

August 1983, five months after the company had become totally dependent on its own in-house computer. The Chairman stated 'I accept also the general strategy of DP development, namely to get things up and running first and add the refinements later'.

Other references to plans included, for example, 'the DP menu outlining possible future DP developments' drawn up by the Finance Director, but this related only to the next six months. In addition, according to the Finance Director, 'the Chairman was very keen, but at too low a level....rather than work out a strategy he would get too bogged down in detail'. There was considerable emphasis on drawing up priority lists for development projects and on time scales for their implementation. This evidence would seem to suggest that any plans made by the company were generally of a short or medium-term nature.

Although analysis of documents did not give any clues to the new technology strategy, interviews with respondents and informants revealed the guiding principles behind its introduction. These were indicated by such phrases as 'the aim was...', 'this was a policy decision...', 'it was decided it should be...', 'the board decided to...'. On this basis, six principles or 'policy decisions' governing the introduction of new technology could be identified. These were all closely inter-related and characterised the Laws approach. As these principles exhibit a degree of consistency they could, according to Mintzberg's (1978) definition, be said to compose the new technology strategy, ie 'a pattern in a stream of decisions'.

1. The first and overriding principle was that the new technology had to be introduced quickly. According to the Finance Director 'the Board decided to take the fastest route'. The justification for this was that technological developments at Laws were so far behind those of its competitors that something had to be done quickly to redress the balance. Estimates of just how far behind the company was varied from 5 years to 25 years. According to the Data Processing Manager, 'there was 5-7 years work to do in 12 months'. Furthermore, to have done it slowly, whilst still maintaining the services of the bureau would have been more costly and the company could not afford dual running. The Project Leader suggested that the technology was introduced under such strict time limits because the Finance Director was on a three year contract and wished to make his mark with Laws before moving elsewhere.

2. The second principle was that in order to introduce the systems in a short space of time packages had to be bought in and tailored to the company's needs. The alternative, according to the Finance Director, would have been to employ a team of analysts to investigate the systems in great detail and identify what was required - taking at least 2 years to complete. It was felt the company could not afford the time and cost involved in this approach.

3. In line with this policy it was decided to employ only a small in-house data processing team. The Chairman disapproved of the large Data Processing Departments which

he had witnessed in other retail organizations. He felt they created a large overhead and were unnecessary for Laws' requirements.

4. As a consequence of the small number of specialist staff a large amount of work was expected of the members of other departments, ie the users. Therefore, the introduction of computers was said to be 'user driven'. Each application had a specific project team consisting of a user representative from the appropriate department and an Analyst Programmer. They held a meeting each week with the user director; the Finance Director; the Data Processing Manager and representatives from IBM to discuss the progress of the project.

5. The fifth principle was, in the words of the Chairman, 'to get things up and running and add the refinements later'. Consistent with the decision to take the fastest route, they chose, as the Finance Director explained, 'to have the systems 90% operational within 6 months instead of 99% in 2 years'.

6. It was further decided 'not to be first in the field' and 'not to pioneer'. Considering the self-imposed time constraint, if untried software or hardware had been utilised and had subsequently failed or been difficult to implement this would have caused delay and additional costs would have been incurred.

It appeared from interviews that these principles were generally accepted within the organization. It is not

clear how these decisions were arrived at, the degree of concensus that existed or how they were communicated throughout the organization. Based on the evidence of other decisions relating to new technology, it could be postulated that these principles were probably proposed by the Finance Director or Data Processing Manager, gained the support of the Chairman and were therefore accepted by the other directors. As no documentary evidence could be found to support this, it is possible that these principles were never subject to the formal decision-making processes at all. They may have evolved during the introduction of new technology as a reaction to circumstances (McLoughlin et al 1985), or as a result of the influence of particular individuals, such as the Finance Director and Data Processing Manager.

Similarly, it is not apparent if these policies were formally communicated to the rest of the company from the outset. A meeting was held prior to the introduction of new technology to inform key organization members of the proposed changes, but on the admission of those involved the full implications were not really understood. Also, most information (or misinformation) was disseminated throughout the company by informal channels, leading to differences in interpretation and further misunderstanding. This can be illustrated by the different definitions given to 'user-driven':

> 'A project that is formulated at the user's request, and run by them under their total control, with the exception of the technical

requirements. They are responsible for it from start to finish' - Data Processing Manager.

'User driven means that the computer department does not input the information, the users do. The users also access the database directly. Generally, the DP Department does not hold the user department's hand' - Operations Director.

'User driven means blame the user - anything that went wrong was our fault, even though we are not computer people' - Training Officer.

The evidence from Laws Stores indicates that the principles guiding the introduction of new technology evolved over a period of time and were never clearly articulated. Only in retrospect, and by virtue of their general acceptance, were they identified by respondents as 'policy decisions'.

THE STRATEGY TO INTRODUCE IN-STORE SYSTEMS

The pressures for the introduction of new technology in Laws Stores branches stemmed from the perceived need to keep up with the developments of competitors. Although at that time, August 1982, only 16 companies, with a total of 27 stores, were currently operating laser scanning in the UK (Musannif 1983). Indeed, even by 1984 it had only penetrated a mere 1.7% of all the country's supermarkets (ICL 1985). This is an indication of the speed at which the company was progressing. Six months previously it had

been said to be '25 years behind the times', now they had not only upgraded their technology to current levels but were attempting to be at the forefront. This rapid rate of technological development did not go unnoticed by the Project Manager, 'they were looking at things like laser scanning whilst we were still struggling with the nominal ledger'.

Despite previous statements about 'not pioneering', Laws introduced technology which even the most advanced supermarket chains were treating with caution. Although both ADS and NCR were long established companies, the equipment chosen by Laws were both new models, previously untested in the field. This competitive pressure to introduce laser scanning can be compared with a study undertaken in the US by the National Retail Merchants Association (NRMA) into reasons for installing point of sale systems. They found the main reason was improved merchandising and display decisions (76%). Whilst expected clerical savings was also given as a major reason (51%), competition (8%) was not found to be a major factor (Musannif 1983).

Initially Laws placed little emphasis on the benefits to be gained from laser scanning. It was not until after its introduction that a memo by the Chairman on 'Scanning - Exploitation and Appraisal' triggered the debate that was to continue for many months.

As with the head office systems there was no pre-determined strategy for the implementation of new

technology into the branches. The directors did not give any indication of how it should be implemented or what objectives were to be achieved. A decision was made on what technology to introduce, into which shops and when. This was passed down to the functional managers concerned and it was left to their discretion to implement.

THE CONCEPT OF STRATEGY

The strategy to introduce new technology into Laws Stores is closely related to Mintzberg's (1978) concept of an 'emergent' strategy which he describes as 'a pattern in a stream of decisions'. This concept contains three important elements:

(a) strategy is not explicit,

(b) it is not developed conciously and purposefully,

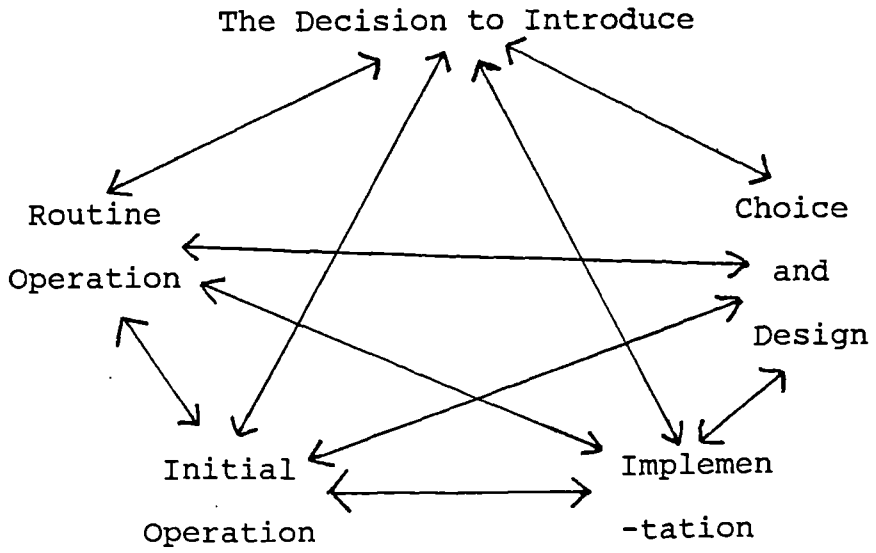
(c) it is not made in advance of the specific decisions.

In this way the six principles outlined above can be seen as 'ex post facto results of decisional behaviour'. This 'emergent' strategy only becomes formalised as a deliberate or 'intended' strategy retrospectively.

This is similar to the work of McLoughlin et al (1985) who saw the introduction of new technology as a series of flexible and changing sub-strategies. According to McLoughlin et al, each sub-strategy is formed at a different stage in the introduction of new technology as a reaction to current pressures, opportunities and constraints. Following the work of McLoughlin et al, five stages were identified in the introduction of new technology into Laws Stores. These were: the decision to

introduce; choice and design of technology; implementation; initial operation and routine operation (Figure 8.1). These stages were not necessarily sequential, they frequently over-lapped and the process was an iterative one, as decisions taken at a later stage would often necessitate the review of an earlier decision.

Stages in the Formation of an Emergent Strategy Figure 8.1



Mintzberg notes the danger of an intended strategy becoming 'overrealized', in that it is implemented beyond the original intentions and the organization is unable to halt its momentum. The 'overrealization' of an emergent strategy is even more dangerous for the very reason that it was not intended and thus the implications were not fully considered. Mintzberg also questions the advice 'make your strategy explicit', as to do so invests it with an even greater momentum. In the context of this research it would seem that to have made the strategy explicit would have overcome some of the misunderstanding which existed.

The lack of a clearly defined strategy or objectives for the introduction of new technology in Laws Stores created a void, thus allowing the middle managers considerable opportunity to influence each stage according to their own wishes. Although this emergent strategy created difficulties for Laws Stores, other organizations where a similar approach to strategy was identified were reported as being successful. Mintzberg (1978) finds differing levels of success in his research into the emergent strategies of Volkswagen and the US Government's policies on Vietnam. Smeds' (1986) reports a successful emergent strategy to introduce a computerised information system (CIS) into a Finnish high technology company. Indeed, she argues that 'any rigidly explicated CIS strategy would have been an impediment'.

It will be noted later in this thesis that the new technology strategy at Wm Low also 'emerged' over time but was, nevertheless, a successful one. To understand why similar emergent strategies can have differing outcomes, it is necessary to examine the processes which shaped the formulation of the strategy in the context of the particular organization.

ORGANIZATIONAL PROCESSES

The factors influencing the success of the new technology strategy can be classified under the heading of organizational processes. These processes are defined as 'the way in which people in groups behave and interact when they are setting objectives, solving problems or

introducing change' (Johannsen and Page 1980). The focus of this study being the interaction of groups, computer specialists and users, when introducing technological change. Four processes in particular were identified as being important in bringing about change at Laws Stores: communication; commitment; conflict; power and politics.

COMMUNICATION

At times when new technology is being introduced, considerable co-ordination between departments and commitment to the project is required. Where circumstances and technology are changing rapidly, decisions need to be taken quickly and implementation co-ordinated. However, communication in the case study company was poor, information passed between different departments was often distorted or, in some cases, totally withheld, either knowingly or unknowingly. For example, the DP Manager and the Area Manager were not prepared to tell the Personnel Director of the existence of information which could help him with his investigation into checkout productivity. As long as he was not using this information, they could continue to criticise his method of collecting data and so cast doubts on his results. Whilst the Personnel Director spent time soliciting information from other store managers and working out his results it was at a cost to the organization, both in terms of time which could have valuably been spent elsewhere and in terms of friction within the organization.

The DP Manager did make some attempt at reconciling the opposing views. During one meeting, which was observed by the researcher, he said repeatedly that he thought, in effect, the Personnel Director and himself were saying the same thing. In a memo following this meeting his opening words were, 'following a number of conversations we have had on the scanning timing exercise you are carrying out I conclude that our views are not so far apart but being expressed in different ways'. All attempts such as this by the DP Manager to rationalise the situation were ignored by the Personnel Director.

Thus, despite attempts at communication, the predisposed views of each party continued to prevail. Each was concerned with their individual goals - the Personnel Director in aiming to 'prove' that laser scanning was slower and the DP Manager in getting the new technology accepted by the company - rather than the goals of the company as a whole. Although not originally defined, these goals later emerged as identifying the benefits to be gained from laser scanning and which could justify it being introduced into other stores.

The case study demonstrates how the Data Processing Manager utilised the formal communication channels to influence the Board of Directors by reporting direct to them on data processing developments and through the many memos which he issued. He also utilised informal communication channels by developing a close relationship with the Finance Director and, after the latter's resignation, with the Operations Director. Therefore,

although lateral communication, ie that between departments, was restricted; the vertical communication channels between different levels in the hierarchy appeared to be more open, thus allowing the DP Manager access to the Board.

The lack of communication in the company and the type of language used illustrated the gap that existed between the computer specialists and the users. For example, respondents frequently referred to 'them and us'. The Finance Director and DP Manager repeatedly stressed the length of time it took to 'educate the users'. Whilst in return the other departments were somewhat doubtful of their knowledge of the supermarket business. This lack of integration was a feature also reported by other researchers investigating the introduction of new technology (Pettigrew 1973, Wilkinson 1983). Wright and Rhodes (1985) noted the lack of understanding they experienced when integrating two different approaches. Mumford and Banks (1967) also note that a criticism of programmers was that they 'spoke a technical jargon'.

This disparity was particularly acute at Laws because of the traditional, conservative nature of the organization and its employees, many of whom had been with the company for some length of time. Most of these had their roots in the North East and were unwilling to move elsewhere. The poor employment prospects in the region further increased their dependency on the company. In contrast the computer specialists were relatively young with highly marketable skills and stayed with the company for only a short period

of time (all three analyst programmers recruited at the beginning left within two years). The Chairman believed that 'in the case of DP you are dealing with people who have a lot of job opportunities. They have strong professional interests.... but can be quite stubborn'.

The integration of computer specialists into the company was further strained by the organization's previous lack of exposure to new technology and the rapid developments it was attempting to make in such a short time. The pioneering nature of the specialists work and short time with the company led them to be committed to the task rather the organization. The high profile of the DP Department and the far-reaching implications of the changes also led to resentment. As time progressed, most of the original computer specialists left the company, those that remained developed closer relationships with members in other departments with whom they had worked in developing particular systems. Their work no longer appeared quite so urgent or pioneering and so the cohesiveness of the DP Department was less strong. The few that remained developed a stronger identification with the company as a whole and gradually became more integrated into it, but never fully so.

COMMITMENT

A review of events in Laws Stores and the comments of respondents suggests that lack of commitment to the technological change was the source of many of the difficulties.

'We did not manage to get the directors involved. They didn't attend any of the project meetings until the Chairman put his foot behind them .... there was just total lack of commitment' - Finance Director.

'nobody was really committed to it' - Data Processing Manager.

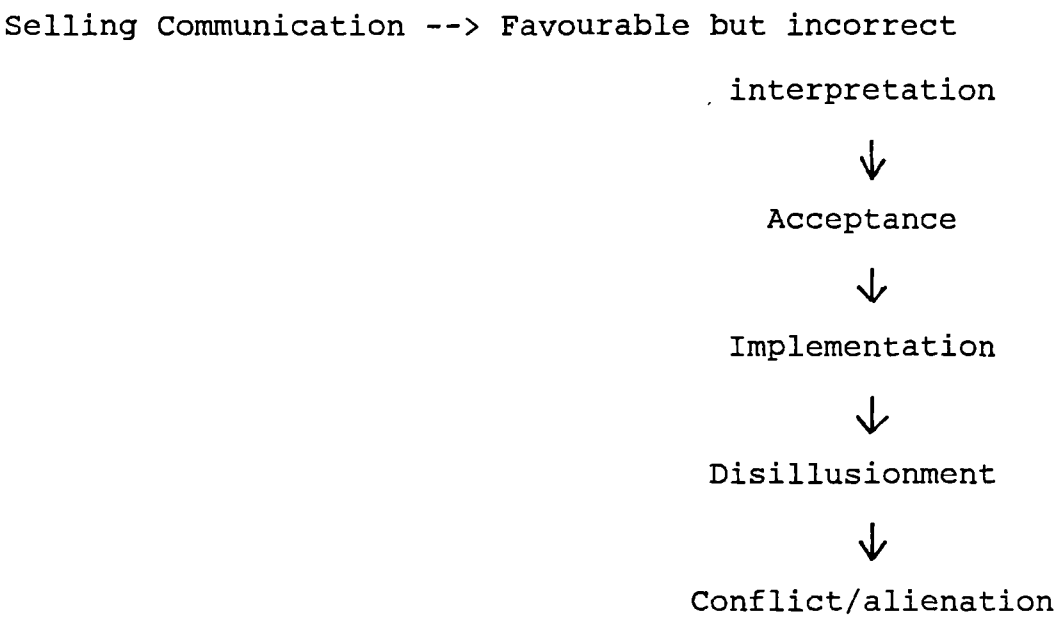
The user directors failed to recognise the need for change and so their attitude was somewhat ambivalent. They agreed to the computer proposals put forward by the Finance Director largely because of the Chairman's enthusiasm. They were reluctant to criticise or raise objections despite the fact that they were not totally convinced of the need for change. Without recognising this need for themselves it was difficult for them to identify with the systems in their own departments. Furthermore, the perceived need to develop the systems quickly meant that the Finance Director chose all the application programs which were simply 'rubber stamped' by the user director, further alienating them from developments within their own departments.

Only at this late stage, because of the small size of the DP Department and the 'user driven' policy, was it necessary to involve the users. They were required to implement computer systems which they did not necessarily perceive a need for, and which they had played no part in designing. Their involvement at this stage took the form of a ten minute report to the Project Meeting each week.

Consultation was still at a fairly superficial level and the users continued to have little influence in the design of the system or the way in which it was introduced. The enthusiasm of user representatives was an important element, noted by both the Chairman and the Finance Director, in the success of particular systems, yet little effort was invested in choosing those individuals or in gaining their commitment to technological change. Their ability to comprehend the systems and their skill in passing their knowledge on to others in the department was also not taken into account.

Many writers (Mumford 1979, Hedberg 1980) argue for the participation of users at an early stage in order to ensure commitment and a feeling of 'ownership' of the project. As this approach is expensive in terms of time and resources it may be counter-argued that the decision to develop systems quickly, and the cost constraints, necessitated an autocratic, 'top down' approach at Laws. The method used was similar to that described by Bessant and Dickson (1982) as the 'marketing approach' (Figure 8.2). The proposal, although passed by the whole Board, really only had the support of the Finance Director and the Chairman. The attempt to 'sell' the decision to the rest of the organization came some months later when the policy of 'user driven' development required that others became involved and undertook responsibilty for their own systems.

Marketing Approach Figure 8.2



Source: Bessant and Dickson (1982)

The response to the 'marketing approach' employed in Laws was also similar to that predicted by Bessant and Dickson. The initial reaction was favourable but the implications of introducing new technology were not fully understood. This is demonstrated by the different interpretations of 'user driven' and a quote from the Chairman, 'according to company policy the users do the initial input and it was not appreciated at the time the considerable workload it created'.

The reaction of the users was not one of outright resistance to the change but more one of passive acceptance. In Judson's (1966) spectrum of possible behaviour to change it would be classified as 'indifference; apathy;.... doing only what is ordered'. Commitment tended to be based on loyalty to the Chairman

and carrying out his decision, rather than any belief in, or commitment to, the task itself. Owing to the lack of participation the users had no feelings of 'ownership' concerning their projects.

The technology seemed initially to be accepted because the first systems to be introduced were within the finance department. As the DP Department came under the Finance Director this had the advantage of keeping developments under the control of one director who could ensure greater commitment to the project and keep all the difficulties within his own department. The documents produced by the Finance Director gave no indication of any serious problems. However, interviews with the Project Leader and the Wages Supervisor, who were responsible for the first computerised systems indicated that they were not entirely satisfied. Owing to their subordinate relationship with the Finance Director, manifest conflict would have been unacceptable and therefore different reactions resulted. The reponse of the Wages Supervisor was to become distressed and suffer strain whilst the Project Leader responded by withdrawing - he left the company in July 1983. He attributed his resignation not to the new technology itself but to 'the way in which it was introduced'. This view was representative of most respondents, and is supported by other researchers (Blackler and Brown 1985, McLoughlin et al 1985) who note that the implementation of change is often more important in shaping attitudes than the technology itself.

As Bessant and Dickson note, 'the early acceptance may lead to a later disillusionment as problems implicit in the use of technology emerge'. They suggest that one way to overcome this is by continuous monitoring and feedback. Attempts to involve the users at Laws in this way were not entirely successful. The weekly Progress Meetings continued, but were said by one participant to be,

> 'mainly a formality. It was a "them and us" situation. the Finance Director, Data Processing Manager and IBM representatives sat on one side of the table and we came in, in turns, and sat at the other. It was a question of them telling us what was required and we reported back about any problems and whether we had met our deadlines'.

This view was supported by minutes of these meetings showing 'report time' at ten minute intervals for each of the departmental applications.

Once the basic systems had been implemented in each department and appeared, at least superficially, to be working smoothly, the weekly progress meetings ceased. The computer specialists then devoted most of their time to developing new systems. The users were expected to identify problems with their own systems and actively seek out solutions, drawing on the expertise of the specialists as necessary. However, they failed to fully understand the implications of the 'user driven' policy. As a result, problems still existed with the systems which were not tailored to the user's requirements. This led to

further conflict, particularly over the development of the in-store systems.

CONFLICT

As was noted above the initial reaction to the new technology was one of passive acceptance and there was very little manifest conflict. There are three major reasons for this. The first was the unwillingness of directors to oppose the Chairman. This has already been referred to and the role of family members will be discussed later. The second was due to the lack of experience and technical knowledge of the users. They therefore felt dependent on the computer specialists for advice and were unwilling to challenge their decisions. Third, the new systems were first introduced into the Finance Department which came under the same director as Data Processing. Thus, any difficulties which arose could be restricted to this area. When the systems were introduced into other departments, such as Buying, Personnel, and the Warehouse, other directors and senior managers outside the Finance Department, became affected. The bugs in the system then became more apparent and new technology was subject to greater debate. The users gained confidence in their own knowledge of the computer systems and began to question the decision of the specialists, often prompted initially by the Chairman.

The inter-departmental friction was evident in the prioritising of DP development projects. This became something of a contentious issue within the company, as

each department head fought to get his system development at the top of the list. One buyer referred to the priority list as the 'Smith's-ometer' (Smith being used here as the psuedonymn for the Data Processing Manager). He indicated that if a user department requested a system development that the DP Manager did not agree with it would simply go to the bottom of the list. Conflict was also apparent in the episode concerning the failure of the PDCs. This was said by the Chairman to have caused a lot of 'bad blood' between the departments concerned: Data Processing; Operations and Personnel, which he attributed largely to the 'arrogant' attitude of the computer specialists who considered everybody else to be 'peasants'.

The question of responsibility was something of a major issue within the organization. At what stage should the system be handed over to the total control of the users? Who is responsible for monitoring the system? Within Laws Stores it had always been decreed that the users would have ultimate responsibility for the systems. However, this responsibility did not include power to influence the choice of systems or the way in which they are implemented. For example, in the laser scanning project the system was chosen by the DP Department without any input from Operations. In addition, whilst there was some pretence at consultation with the Area Manager and Store Manager in the decisions about implementation, in reality the DP Manager controlled these meetings.

The Store Manager accepted responsibility for implementing and operating laser scanning, but no-one monitored the effectiveness of the system. This was a vital factor considering that these were trial stores on the basis of which it would be decided whether or not to extend the system to other branchess. The Area Manager did not consider laser scanning to be his responsibility 'I've too much to do, it should be the responsibility of someone at head office'. Similarly the DP Manager was only concerned with designing and implementing the system and not following it through. The Operations Director drew attention to the fact that in a priority schedule drawn up by the DP Manager, items 1-10 were all new projects, whilst 11 onwards were enhancements to existing systems. It was also illustrated in Chapter 7 that although no decision had been taken on the future of laser scanning, the DP Manager proceeded to evaluate the benefits that might accrue in a further two stores. When asked if the cost had been justified in the two stores already installed, he was hesitant and unsure.

Conflict has frequently been noted as a feature of technological change. This may be between computer specialists and line management (Mumford and Ward 1966), management and workers (Wilkinson 1983), head office and branch factory (Rowe 1985) or within the management services group itself (Pettigrew 1973). This conflict stems from the nature of technological change whereby one group is often seen as promoting and benefitting from the change, whilst the other has a vested interest in maintaining the status quo. Thus, they immediately form

two opposing camps, referred to by Kahn et al (1964) as the 'old guard' versus the 'new guard'. The resentment was particularly acute at Laws where heavy investment was being made in data processing despite the fact that the company had limited funds and cut-backs were being made in other areas. These particular features, related to the stagnation or slow decline of Laws, will be discussed in the next chapter.

In Laws Stores, conflict existed primarily between computer specialists and other staff functions. These differences were illustrated in two ways. First, by the terminology used, the Data Processing Manager was said to be 'empire building', and there was frequent reference to 'them and us', ie the computer specialists and the users. Second, in the contradictory views on the success of the laser scanning project. According to the DP Manager it went very smoothly, but the Personnel Director judged it 'inefficient from start to finish'.

The difficulties between the Personnel Director and the DP Manager have already been illustrated. These were caused by the Personnel Director being installed as a watchdog over the project, the DP Manager felt that he was usurping his role without being qualified to do so. Difficulties also arose between the DP Department and the Buying Department. The latter felt they should have been involved in the laser scanning project at an earlier stage when they could have been helpful in obtaining barcodes from manufacturers. When, later on in the project, barcodes became a problem the DP Manager reported that barcoding

was not his job and the problem should be taken up by the Buyers. The Buyers on the other hand no longer considered barcoding to be their responsibility, but felt that it was up to the DP Manager to 'earn his corn'.

It has been demonstrated that the level of conflict increased over time, reaching a peak over the issue of laser scanning shortly before the takeover. Greater manifest conflict in the earlier stages may actually have been advantageous as it would have facilitated a greater searching for alternative solutions, in particular more suitable software packages. In addition, if the users felt they had been responsible for the choice of technology, this would have led to greater commitment in the later stages. However, several respondents indicated that their first encounters with the DP staff influenced their attitudes to the whole department and to the new technology. Therefore, if increased conflict had taken place in the early stages it may have been detrimental, by leading to what the Chairman termed 'bad blood' at a later stage.

POWER AND ORGANIZATIONAL POLITICS

Another feature of the introduction of new technology into Laws Stores was the exercise of power and the political behaviour which was involved. This was explicitly referred to in interviews, when respondents attributed political behaviour to others, or even in some cases, to themselves. This contradicts the view of Burns (1961) who noted that individuals are reluctant to admit to behaving

politically. The Chairman, in his description of DP staff, said that 'they need to be encouraged and dealt with in a negotiating sense. They have to be manipulated'. Comments made by other members included:

> 'I had to use my power to get or change the user to one which was committed' - Finance Director.

> 'I saw through.... (the Finance Director) early on, it was clear he was going to do his own thing. He and.... (the Data Processing Manager) were great buddies, there was a lot of politics in it' - Project Leader.

The Finance Director clearly recognised the importance of gaining the Chairman's support,

> 'In the decision-making process it was the Chairman who had most influence. If he had not been convinced the changes would not have gone through..... It was my job to convince the Chairman who would then make the decision'.

The power of the Data Processing Manager appears to be a significant aspect in the emergent strategy to introduce new technology into the stores. Power is defined as 'the ability of one party to get another to behave in ways incompatible with the latter's immediate interests' (Brown 1983). The effect of this power is demonstrated by the seeming ease with which the Data Processing Manager was able to persuade the Area and Store Manager to sacrifice what would normally have been their first priority, the management of the total store, in favour of

the specific details of introducing new technology. This power stemmed from a variety of sources. First, is the perceived specialist knowledge of the Data Processing Manager and his 'assessed stature' (Pettigrew 1972). Others in the company believed him to have a technical competence which they did not possess. Therefore, this created a situation of dependency, which was increased still further by the uncertain nature of the innovation they were introducing.

The second source of power stemmed from the Data Processing Manager's structural position immediately below the level of directors. By acting as a 'gatekeeper' (Pettigrew 1972), through which information was channelled, he was able to distort or withold information and thereby influence the decision-making process. For example, the details on productivity, automatically captured by the checkout equipment, were sent to to him each week, but this information, which would have assisted the evaluation of laser scanning, was never made available to the directors. The third source is related to the second and involved the access of the Data Processing Manager to the key decision-makers, sometimes referred to as the 'dominant coalition' (Child 1972). By reporting direct to Board Meetings on the stage of data processing developments, and through his great propensity for writing and circulating reports, he had frequent opportunities for influencing their decisions.

Observation of meetings, analysis of documents and interviews with individuals, showed that the Data

Processing Manager not only possessed these three sources of power but also had the ability to use them effectively (Pettigrew 1972). The fourth factor, therefore, contributing to the Data Processing Manager's power, was his political sensitivity and the skillful use of his resources. The introduction of laser scanning demonstrates his skill in identifying individuals who were involved in new technology decisions. By developing inter-personal relationships and issuing memos, he attempted to influence their views. The Data Processing Manager himself described laser scanning as a 'classical example - no-one wanted it, not the Board or the users, no-one, but you only had to convince the Chairman and he would tell the others'.

The Personnel Director attempted to gain support for his own views by visiting company branches and through discussions within his own department. The fact that those he attempted to influence, Store Managers and Personnel Officers, did not play any role in the decision-making process, showed his lack of political sensitivity compared to that of the Data Processing Manager. He was also hindered by his lack of assessed stature, despite being senior to the Data Processing Manager he did not possess any technical skills which would give credibility to his claims.

In addition to the DP Manager, the Chairman and his son also exercised power. However, there were several distinctions between these two types of power. The DP Manager used his power over other members of the

organization, such as the Store Manager, Area Manager, Accountant and Directors, in order to gain acceptance for his proposals concerning new technology. His power was multi-directional and those who were subject to it did not neccessarily agree without question, for example the Personnel Director. This particular dimension of power is termed 'influence' by Bacharach and Lawler (1980). The DP Manager exercised his influence by making proposals, offering advice and persuasion. He was not in a position to make the final decision and therefore devoted much of his attention to influencing the Chairman and his son, who possessed the authority to make the final decision.

In contrast, the authority of the Chairman was accepted without question. For example, it was shown in the case study that once he had made the decision to proceed with computerisation the other directors raised no objections, despite not being totally committed. Therefore, the major distinction between the power of the DP Manager and that of the Chairman was that the former possesed influence which was multi-directional, those who were subject to it did not suspend their critical faculties, and he was only able to affect decisions indirectly. The Chairman possessed the authority to make the final decision, it flowed in one direction (ie downwards) and subordinates acquiesced without question (Bacharach and Lawler 1980).

The sources of the DP Manager's power discussed earlier, were identified as specialist knowledge; access to decision makers; political sensitivity and structural position. This is contrary to the findings of Bacharach

and Lawler (1980) who note structure only as a source of authority. Nevertheless, the DP Manager's influence stemmed, in part, from his structural position as 'gatekeeper', through which information about the new technology was channelled. The authority of the Chairman was also found to stem from his structural position at the top of the hierarchy. As chief executive he was in a position to control material and symbolic rewards, and as such apply sanctions where necessary. In addition, as Laws operated with a functional structure he was the only one who was fully informed of what was happening in the company as a whole. A point which will be expanded upon later in this chapter.

The Chairman also commanded 'traditional' authority (Weber 1947), a source of power not noted by Bacharach and Lawler. This traditional authority stemmed from his role as owner of the firm and an established belief within the organization that it was his prerogative to make decisions such as the introduction of new technology. As Weber notes 'the obligation of obedience is not based on the impersonal order, but is a matter of personal loyalty'. Thus, commitment was to the Chairman himself rather than to the task. A point which was raised previously in the section on commitment.

Faced with the power of the DP Manager and the Chairman and his son, other members of the organization appeared to have little opportunity to influence decisions concerning the new technology. In view of this, their attitude was one of acceptance and apathy. Initially, the DP Manager

and the Finance Director, were given something of a free rein to develop the technology according to their own wishes, receiving the necessary rubber stamp from the Chairman. However, as time progressed the approval of the Chairman was more dificult to gain. This can be seen from minutes of meetings and memos at that time.

> 'There was discussion about the Future Development list. ....(The Chairman) said it would be desirable to have a separate one-page evaluation, including time scale, for each project' (Minutes of Executive Meeting 6 April, 1984).

> '....(The DP Manager's) report of September 1984 draws together such information as we have and a number of alternatives for future development but we do not yet have a comprehensive evaluation of costs and benefits' (memo from the Chairman 21 September 1984).

Thus, the balance of power began to shift away from the DP Manager towards the Chairman and his son. This was further reinforced when the Finance Director resigned, by bringing the DP Department under the authority of the Operations Director (the Chairman's son). This shift also meant that, following the initiative of the Chairman, the users felt more inclined to criticise the DP Department.

Political activity, defined as 'the deployment of strategies and tactics through bargaining and negotiating, aimed at the protection of personal and departmental

interests' (Stephenson 1985), was a notable feature of the introduction of new technology into Laws Stores. It was illustrated by such episodes as: the DP Manager's continuous proposals for new developments; attempts to influence the Chairman by memos and meetings; the Personnel Director visiting stores to gain information from, and influence the views of, the branch managers.

A review of the literature provides possible reasons why political activity should be such a significant feature of the introduction of technology at Laws Stores. Pettigrew (1973) identifies four critical factors in political activity: the history of social relationships; organizational attachments; likes and dislikes and uncertainty. The first three factors were found to be closely related at Laws. Organizational attachments were strongly grouped along functional lines. This was particularly noticeable when respondents gave their views on certain issues (often unprompted) in exactly the same terminology as other members of their department. For example, both the Personnel Director and Training Officer spoke of the DP Department as 'empire building' and preferring to work with 'yes men'. The DP Manager and Finance Director often spoke of 'educating the users', their 'lack of commitment' and 'they don't know what they want'.

Likes and dislikes also focused on departmental groupings, the Personnel Director's dislike of the Finance Director spilled over onto his relationship with the DP Manager, a subordinate and close ally of the Finance Director. This

feeling also extended to the rest of the Personnel and Data Processing Departments. After the Finance Director helped the Training Officer following a minor car accident, she reported feeling guilty and disloyal to her boss (the Personnel Director) because she now liked the Finance Director! These inter-departmental difficulties were not restricted to the above departments but extended throughout the organization. The Operations Department had a poor relationship with the Buying Department. Both functions were inter-dependent with the faults of one easily being blamed on the other. The Chief Accountant felt that the Finance Department was ostracized from the rest of the organization altogether, describing the department as 'the lepers in the corner'.

The third factor, the history of social relations within Laws Stores was simiarly marked by poor lateral relations. The history of the firm, as told by the organization members, was marked by conflict between different functional directors. Relationships became so bad, that at one point the Chairman called together meetings with pairs of executive directors in order to,

> 'examine the state of play, whether there are problems, and if so, to establish a timetabled programme for dealing with them'.

> 'It is up to those concerned to raise any and all cases where the performance and costs of activities for which they are responsible are adversly affected by the performance of

activities for which the other Executive is responsible'. (Memos from the Chairman to all Executive Directors).

The fourth factor noted by Pettigrew, and possibly the most important in the context of this research, was the degree of uncertainty and instability. This is a feature which has been noted throughout the thesis. Uncertainty could be found in many areas, in particular the environment. Several changes were taking place in the supermarket industry, not least of which was the number of takeovers that were occurring. This created considerable doubt regarding the future of Laws Stores. The technology itself also created instability. To introduce a whole new management information system into a company which had no previous experience of computerisation, provided not only a technically complex set of problems, but also created uncertainty in the way in which the organization would be able to adapt to the new situation. In addition, the technology itself, for example EPOS, was highly dynamic. At the time of its introduction into Laws Stores (March 1984), it was still not well established in the UK, and the price was continuing to drop, whilst improvements were being made in the quality and range of systems available.

Two further factors also enhanced political activity in Laws Stores. One stems from the lack of strategy or long term objectives for the introduction of new technology which has already been discussed. This void left considerable opportunity for different individuals or departments to manouevre the situation to their own

advantage. The second relates to the company's lack of growth. This led to a decreased number of resources, and increased political activity in order to control those resources. The issue of the company's decline will be dealt with in the next chapter.

SUMMARY

This chapter has shown that, in principle, a number of alternatives were open to the company. This was not only in terms of the hardware and software that was available, but also the way in which the technology was introduced and utilised. Nevertheless, the senior management failed to recognise this choice. From the evidence presented in this chapter it can be concluded that the strategy to introduce new technology into Laws Stores was not formulated and explicitly stated in advance.

As developments progressed the strategy evolved as a 'pattern in a stream of decisions' (Mintzberg 1978). *Important elements of this strategy included introducing* the new technology quickly and adopting a 'user driven' approach. The organizational processes that existed within the company were found to play a key role in shaping the strategy and influencing its implementation. In particular, communication, commitment, conflict and power and politics were identified as important.

9. FACTORS UNDERLYING THE NEW TECHNOLOGY STRATEGY AND ORGANIZATIONAL PROCESSES

The previous chapter illustrated how the strategy to introduce new technology into Laws Stores evolved. It demonstrated the role that the organizational processes played in shaping that strategy and in influencing its implementation. However, it did not explain the factors underlying those processes and why they existed at Laws Stores. The aim of this present chapter, therefore, is to analyse the causes which gave rise to those processes. It then goes on to demonstrate the relationship that existed between the organizational processes, their causes and the strategy to introduce new technology and illustrates this with the aid of a model.

The underlying factors were traced through a closer examination of events at Laws Stores and the comments of respondents. Further insights were gained through analysis of the grocery retailing environment and a review of the relevent literature on organizational behaviour. The key factors giving rise to the processes were identified as: the environment; the organization structure; family ownership of the company and the decline of the organization.

ENVIRONMENT

Chapter 2 identified a number of important features of the grocery retailing industry, for example increased

concentration in the hands of multiples, a move to larger stores in out of town sites, a proliferation of takeovers, more sophisticated management techniques including the use of new technology. These factors combined to make the environment in which Laws operated highly dynamic and unstable. However, as will be explained in the next chapter, Wm Low operated in a similar environment and was faced with the same technological problems as Laws Stores but did not experience the same difficulties. The key difference lies in the company's perceived ability to 'enact' the environment in which it operates (Weick 1969) or, where necessary, its ability to adapt to it.

Previous chapters have demonstrated how Laws was unable to alter the environment in which it operated. The case of technology was illustrative of this. Prior to the introduction of the in-house computer it had been unable to proceed with the developments it wished because it was constrained by the bureau. When the in-house computer was installed Laws failed to obtain a satisfactory service from IBM. In the case of laser scanning the company was largely led by its suppliers, to whom they felt obliged, despite the fact that the suppliers were benefitting by using Laws as a demonstration site for prospective customers.

Laws generally took a reactive attitude to what was happening in the environment. For example, the main spur to introduce laser scanning was because its competitors were doing it. Similarly, PDCs were introduced into the branches because other supermarket chains were using them,

not because a specific need had been identified. In this sense Laws fits closely with Miles and Snow's (1978) typology of a 'reactor'. These are 'organizations in which top managers frequently perceive change and uncertainty occurring in their organizational environments but are unable to respond effectively'. The detailed comparison with Wm Low in Chapter 11 will show how it took a much more proactive role in shaping its environment, this is illustrated both by its approach to new technology and its takeover of Laws Stores.

Another key factor in the case study was the rate of adaptation to changes in the environment. Laws Stores had been slow to adapt to environmental change in many respects, for example it still operated a large number of small stores, under 1000 square feet in size, whilst its competitors were closing their smaller stores and opening much larger ones. The last store to be opened by Laws, 10000 square feet in size, was still considerably smaller than those of its competitors. (The average size of store opened by Wm Low in that same year was 16,500 square feet; J Sainsbury, 19,000 square feet and Tesco, 33,000 square feet). Laws Stores was particularly slow to adapt to changes in new technology (with the exception of laser scanning). Other supermarket chains, including Wm Low, introduced their first in-house computer twenty years before Laws Stores.

To a certain extent, Laws had begun to redress the balance and was attempting to respond to environmental pressure, for example by the introduction of new technology.

However, the organization seemed unable to adapt successfully to such rapid change. One reason already suggested was associated with the decline of the organization, another lies in the organization structure. Prior research has suggested that in order to improve adaptability to environmental uncertainty and instability an organization should adopt a flexible, organic type of structure (Burns and Stalker 1961, Lawrence and Lorsch 1967). However, as has already been indicated in previous chapters, and will be expanded in the next section, such a structure did not exist at Laws Stores.

STRUCTURE

Contrary to other research findings (Andersen and Pedersen 1980, Dawson 1983, Child 1984) the research at Laws Stores and Wm Low showed that the introduction of new technology had little impact on the organization structure. Some minor structural changes were necessary to accommodate the new Data Processing Department, but there was little impact on the structure of the rest of the organization. On the contrary, the important implication of the case study was found to be the effect of the existing organization structure on the introduction of new technology.

Laws Stores operated with a functional type of organization structure in which each individual had a clearly defined role and departments were confined within particular boundaries. This type of structure was suited

to stable conditions (Burns and Stalker 1961, Mintzberg 1979, Miles and Snow 1978), in which the high degree of specialisation leads to greater efficiency. However, in unstable conditions this type of structure leads to problems in lateral relations, ie those between departments. In the case study company the functional structure and associated vertical lines of communication, ensured that only those at the top of the hierarchy saw the total picture. The 'user-driven' approach to the introduction of new technology, in which the members of user departments co-operated with computer specialists, was alien to them. The view taken by many of the users was that it was the duty of the DP Department to undertake all technological developments, from initiating the proposal, through implementation, to maintainance of the system. By putting the emphasis on the users, DP specialists were somehow thought to be shirking their responsibility.

Furthermore, the structure promoted divisions between departments and created boundaries which could not easily be crossed. This lack of interaction encouraged members to put sub-goals, departmental goals, above those of the company as a whole. Thus managers tended to develop sub-strategies reflecting their own departmental interests. This ultimately led to inconsistencies in the introduction of new technology and an absence of common goals. The case study illustrates how the Data Processing Manager was more concerned with the implementation of laser scanning rather than the costs and benefits to the

total organization. The failure to take into account the views of the store managers in the design of the PDCs resulted in an increased workload and a lack of commitment to the new system.

The introducton of technology created situations in which it was necessary for departments to co-ordinate their actions and intentions. As was shown earlier, this led to problems of conflict and poor communication. This type of organization structure and the limited lateral relationships also made it more difficult to integrate the new computer specialists into the company. Hedley (1970), in a study of computerisation, also noted insufficient liaison and lack of communication which he attributed to specialisation of functions and internalisation of sub-goals. The differing views of the Personnel Director and the Data Processing Manager on the success, or otherwise, of the laser scanning project and whether or not it led to increased checkout productivity demonstrates the problems of conflict that surrounded the project and the polarisation of the stances taken (Argyris 1967).

Such conflict led to an increased dependence on superiors as disputes frequently had to be referred up to them to be resolved. This difficulty was identified by a number of respondents within the company, including the Chairman, 'lateral relationships are not so good, decisions go up to director level, across and back down again'. When a director was himself involved, the decision was referred to a more senior director. As the Personnel Director was

involved in the laser scanning dispute the problem went to the Operations Director (who is also Deputy MD and son of the Chairman) for a decision on action to be taken. Inter-departmental difficulties aside, the traditional functional pyramid leads to a rigid organization which is less innovative and lacks commitment to new ideas. Who could blame the Store Manager and his staff for not being committed to laser scanning when they could see the conflict going on above them. The disputes were not always held behind closed doors, but frequently took place in the store in front of the Manager. The Store Manager admitted finding 'the clash' between the Personnel Director and DP Manager 'unsettling', particularly as he was in the middle of it all.

The functional organization structure also had implications for the level and direction of communication within the company. The previous chapter demonstrated that horizontal communication was restricted to the extent that the exchange of information across departments could be distorted or witheld. In addition, the vertical communication channels were used by the DP Manager to influence the Board on decisions concerning the introduction of new technology.

Therefore, it is argued that the organization structure at Laws Stores constrained the company's ability to adapt to, and fully exploit, the new technology. It was not found, as was suggested by Chandler (1962), that structural changes automatically followed the changes in strategy.

Chandler failed to recognise the necessary intervening variable of the dominant coalition who must, as Child (1972) indicated choose to make structural changes. In addition, this thesis has demonstrated that the emergent strategy is shaped by the processes arising, at least in part, out of the existing organization structure. Furthermore, unless an organization structure is chosen that is consistent with the strategy, implementation of that strategy will be limited in success. In this sense, contrary to the views of Chandler, strategy follows structure.

LAWS STORES AS A FAMILY FIRM

Laws Stores was owned and managed by descendents of the founder. The important influence of the Chairman in new technology decisions has already been referred to. The DP Manager commented,

> 'If there was any disagreement over the new technology it would largely be over-ridden, there was little attempt to discuss it.... you only had to convince the Chairman and he would tell the others'.

As highlighted in earlier chapters, this family interest was found to be a key factor in the introduction of new technology. The Chairman and his son were unable to divorce their roles as owners from those as operating managers. It is questionable whether such rapid development and investment in technology (considering the company's poor financial state) would have been allowed to

At Laws the problem of recruiting and retaining suitably qualified and experienced staff was not confined to the Data Processing Department. The Finance Director left after less than three years, one of the reasons given for this was that he had put a number of proposals to the Board and when these were not accepted he became frustrated and disheartened. The Marketing Director and several middle managers, for example Buyers, Personnel Officers, and Accountants, also left after only a short time. One reason for this, the difficulties associated with a declining organization, has already been discussed. A second reason was the lack of influence and opportunity in a company dominated by family members.

One senior executive who did remain with Laws until it was taken over was the DP Manager. As demonstrated in the previous chapters his specialist knowledge and political skills enabled him to exercise power quite successfully and gain acceptance for most of his new technology proposals. The coalition of the DP Manager and the Finance Director during the early stages of technological developments was particularly powerful and considerable changes were achieved in short space of time. According to the DP Manager he did consider leaving when the Finance Director announced his resignation, but later found he was able to work successfully reporting to the Chairman's son, the Operations Director.

A further difficulty at Laws was that there were not enough family members to fill all the positions of power within the company. Although at first the Data Processing

Department was under the control of the Finance Director, when he resigned the opportunity was taken to bring it under the control of the Operations Director. This was done ostensibly because he claimed to be more 'objective' about data processing matters. However, it is likely that now the family members had acquired some knowledge of computers the opportunity was taken to bring this vital function under their control and attempt to reduce their dependency on the technical expert, the DP Manager.

Another feature of Laws as a family firm was the tendency of the Board of Directors (with the exception of the Finance Director) to readily concur with all decisions taken by the family members. Donnelly (1964) describes this as a 'yes man' management team. This loyalty to the company, and in particular the Chairman, could have been an advantage when introducing new technology enabling it to be done quickly and without any outright objections. However, through interviews it became apparent that commitment was to the individual rather than to the task. (This was also noted as a feature of the Chairman's 'traditional' authority). Employees did what was necessary with the new technology because this was the Chairman's wish. They were not convinced that this was necessarily advantageous to themselves or the company as a whole. Consequently, when problems became apparent later, staff were not committed enough to the new technology to be able to identify and rectify those problems.

Lack of capital was also a limiting factor in the introduction of new technology in Laws Stores. Dual

running of all systems on the bureau and the new in-house systems was thought to be too costly, therefore developments had to take place quickly. This compares with Wm Low where there was no cost ceiling imposed on the new developments, the capital for which having been raised by a rights issue. As a private family firm, Laws Stores did not have this option of raising money for investment on the open market. The alternatives being internal funding or a loan from a financial institution. Both of which have their limitations, either in terms of availability or cost.

ORGANIZATIONAL DECLINE

Before discussing the implications of decline for the introduction of new technology, it is first necessary to establish that Laws Stores was experiencing decline. As a privately owned firm, detailed financial information was not available, but other indications suggest that, if not actually in decline, the company was at least stagnating. Analysis of company documents showed that sales consistently fell below those budgeted. A memo from the Finance Director (3 April 1982) proposing a three year plan notes that 'the 1982/3 budget shows a negative growth rate'. The Personnel Director also identified one of the company's weaknesses as 'our sales have consistently fallen below budget for far too long a period' (memo 2 August 1982).

The year to April 1984, showed a profit of £45,000. This was an increase over the loss of £500,000 the previous

year during which much of the investment in new technology had occurred. However, the comments of the Chairman at the time of the takeover indicate that this increase was not viewed as a major turnround in the company's fortunes. In a report in the Newcastle Journal of 9 January 1985 he describes the company as 'a business that could not be seen to be viable in the medium or long term'.

Whetten (1980) notes a decrease in the number of employees as an indication of decline, but at Laws the number of staff employed actually increased. This was due to the replacement of full-time staff with part-timers. At head office a small number of staff, including one Buyer, agreed to take volountary redundancy. In addition, some executives left and were not replaced, for example the Finance Director, Personnel Officer and Work Study Officer.

The significance of the decline of Laws Stores is best represented by comparison to what it had been before, and by comparison to the current developments to its competitors. At one time Laws had been the major supermarket chain in the North East of England, at its peak operating over 60 stores in the region. It was later overtaken by Presto, Hintons and Fine Fare, whilst other chains such as Sainsbury, Tesco and the Dee Corporation were expanding into the area. Laws was experiencing what Whetten (1980) described as 'decline-as-stagnation', whereby the percentage share of the market decreases, as opposed to a contraction of the total market. The major chains were opening up to fifteen new stores each year,

Laws had not opened a new store for two years prior to being taken over.

The major implication that the organizational decline had for the introduction of new technology was that the Data Processing Department were seen to be getting a large proportion of the limited resources that were available. Investment in computers was being made, whilst at the same time no new stores were being built and the number of head office executives was being reduced. This led to increased conflict as departments fought for their share of the smaller cake. Increased political manoeuvering took place as they attempted to influence decisions in favour of their own needs. The user departments lacked commitment to the changes which they could see as being of no direct benefit to themselves or their own departments. For example the Non-Foods Buyer was unwilling to assist in resolving the problem of poor barcodes as his department had not been consulted about laser scanning in the early stages of development. Other writers have also noted that organizational decline tends to lead to increased conflict and increased politicking (Robbins 1983). As Whetten (1980) notes 'decline tends to exacerbate interpersonal and interunit conflict within an organization'.

A further problem which may have been associated with the decline of the company, was the loss of valuable executive staff. The Finance Director left after less than three years, there was a high turnover of DP staff and several other executives stayed for only a short while. Robbins (1983) notes that

> 'some of the first people to leave an organization when it enters the stage of decline are the most mobile individuals such as skilled technicians, professionals and talented managerial personnel. These, of course, are typically the individuals that the organization can least afford to lose'.

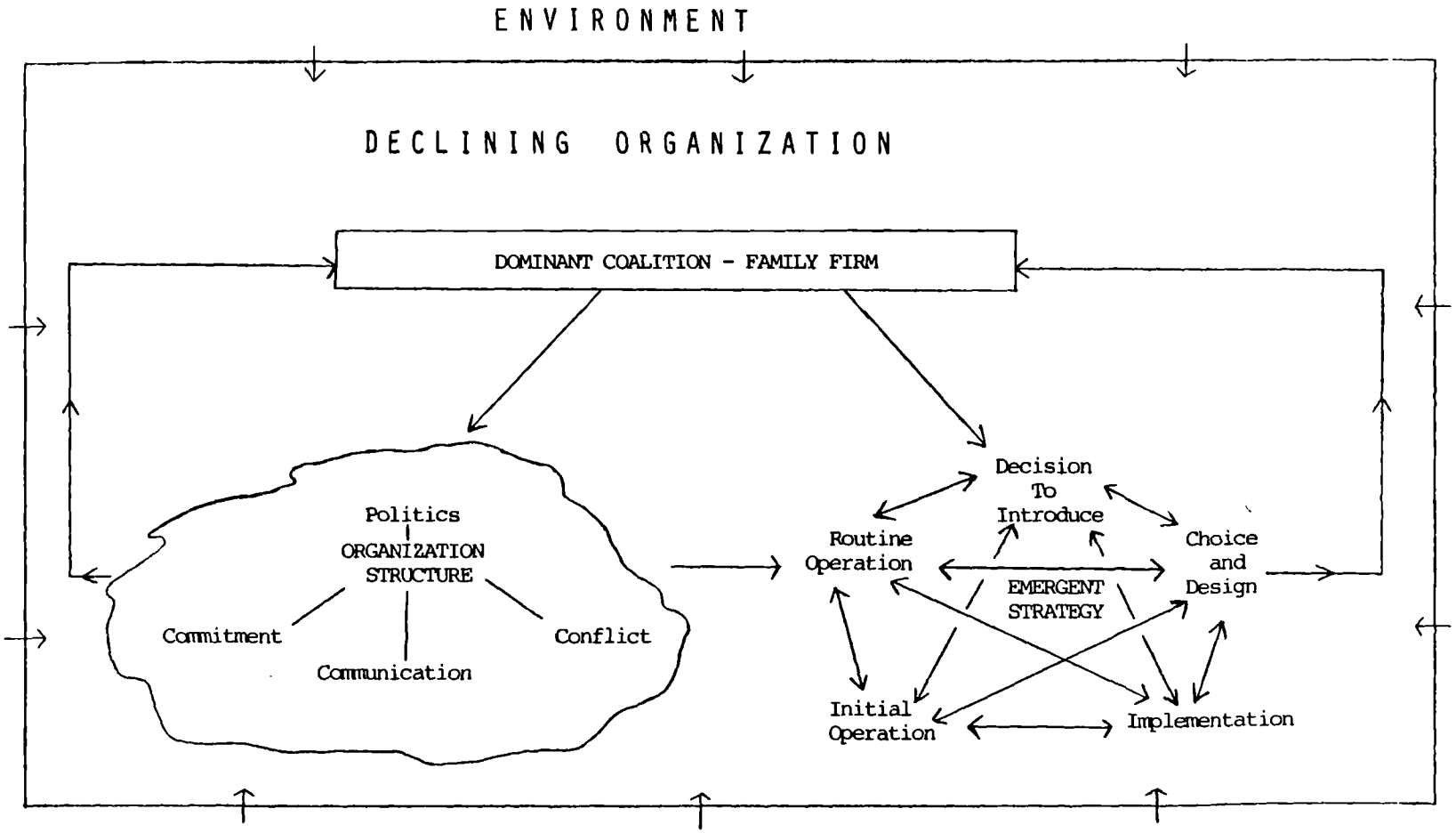
Whilst increased conflict, politicking and difficulty in retaining staff has obvious implications for the introduction of new technology, an even more significant feature is the way in which an organization in decline responds to change. According to Robbins (1983), decline leads to increase resistance to change as vested interests thwart change efforts. Hannan and Freeman (1978) conclude from their research that organizational systems respond more slowly to environmental changes in decline. Whetten (1980) also notes that as a result of poor integration in declining organizations top management were unable to formulate a co-ordinated response to environmental change.

STRATEGY, PROCESS AND UNDERLYING FACTORS

Chapter 8 has shown how the emergent strategy to introduce new technology was influenced by the processes of communication, commitment, conflict, power and politics. The reasons for these processes were traced to four factors: environment; organization structure; family ownership and the decline of the company. Figure 9.1 illustrates the complex set of inter-reltionships between the different elements of strategy, process and the

Figure 9.1

Explanatory Model To Show The Relationship Between Organizational Processes And The Strategy To Introduce New Technology



underlying causes. This shows how, within the constraints of the the uncertain environment and the decline of the company, the members of the dominant coalition, ie the owning family, made decisions about the organization structure and the strategy. The processes, operating within the constraints of the formal organization structure, also directly effect the strategy to introduce new technology as it emerges. Feedback loops exist from the structure as members of the organization attempt to influence the decisions of the dominant coalition. Similarly, feedback from the emerging strategy may also cause some decisions to be reconsidered.

SUMMARY

This chapter has identified four factors as being significant in the introduction of new technology into Laws Stores. These were: the family ownership of the firm; organizational decline; an uncertain environment and a functional organization structure. These factors gave rise to organizational processes such as internal politics; conflict and poor lateral communication which shaped the emerging strategy to introduce new technology. In addition, they constrained the company's ability to implement that strategy and fully exploit the potential benefits of new technology.

10. THE TAKEOVER AND WM LOW & CO PLC

During the early 1980s a large number of acquisitions and mergers took place in the retail trades. This chapter discusses the takeover of the case study company, Laws Stores, by the larger Scottish supermarket chain, Wm Low. The takeover itself is dealt with briefly, the main focus is on the technological implications. This includes the direct effects on Laws' technology and an explanation of computer developments in Wm Low.

THE TAKEOVER

At 8.30 am on Thursday 27 December 1984 Laws Stores Executive Directors were called into the Chairman's office to be notified of the takeover. Each Director then called in his immediate subordinates and made the announcement. Whilst this was taking place, the Chairman informed all other office staff over the public address system. The Area Managers visited the stores with written announcements of the takeover.

The takeover was described by one respondent as 'a very well kept secret'. As a family-owned private company, only one person outside the family had been told of the plans. This was the Finance and Administration Director whose involvement was necessary because of the financial and property details required by the purchaser. Although a number of acquisitions had taken place in the retail industry recently, no-one in the company (with the

exception of the Chairman, his son and the Finance and Administration Director) was aware that the takeover of Laws Stores was imminent.

The shocked response of the directors, executives and employees is best summed up by the comments of the Computer Operations Manager,

> ' On Thursday morning we were told to go into the Director's office. The Area Managers, Warehouse Manager and others were also there. We expected a pat on the back for getting deliveries out and things over Christmas. Instead we were handed an envelope and told, "In there is a statement from the Chairman and from the Managing Director of Wm Low, announcing that the company has been sold to them." everyone was open-mouthed.'

The following Wednesday the Managing Director of Wm Low spoke to the executives of each department informing them of the current situation and the immediate plans. A number of Wm Low executives then undertook a survey of the operations of Laws to ascertain their future plans regarding the integration of the two companies, branch closures, future system development and possible redundancies.

In the Newcastle Journal of 9 January 1985, the Chairman of Laws Stores outlined why the company had been sold.

> ' The going had become just too tough for a company of our size..... You can't pin it down

to a particular date. I would say that for over a year tentative plans were being made which I saw as contingent only. If we'd had a recovery I would probably have deferred selling. At the end of the day, however, it was inevitable..... in 1984 there were approaches from six different companies or their agents.'

The takeover of the company was formally agreed on 11 January 1985 and the Chairman resigned. His son had already done so before the new year. The other directors had left the office early in the new year, although they effectively had not resigned because of legal complications concerning severance pay.

By then Wm Low had made it clear that they would close down Laws Stores head office. A core of area executives and support staff (approximately ten) would be based at the warehouse. Most of the secretarial and clerical staff were given redundancy notices for the end of March. Some were retained for a little longer to maintain administration services in Gateshead until the two companies were integrated. Four secretarial and clerical staff (the longest serving employees) were retained to work in the office to be established at the warehouse. The departure of the executive staff was staggered over the following months depending on the rate of integration of the systems and when the executives secured positions elsewhere. Three executives were offered positions at Wm Low's head office in Dundee. Only one of these, the Data Processing Manager, accepted. He had been largely

responsible for the rapid technological developments at Laws and was reported to be highly regarded in the computer industry. Wm Low intended to upgrade their data processing capabilities so he was appointed to the position of Information Systems Controller, above the incumbent Data Processing Manager, and reporting to the Finance Director.

TECHNOLOGY IN LAWS STORES - THE EFFECT OF THE TAKEOVER

Immediately following the takeover it was implied, by the Operations Director and the DP Manager, that the technology had been a major factor in the acquisition and that Wm Low may wish to install the IBM system 38 in their head office in Dundee. In the event, however, this did not occur. Laws Stores' systems were gradually transferred to Wm Low's ICL mainframe over a six month period. The system 38 was sold off to a third party and the DP Manager took up his position in Dundee.

Members of Wm Low were critical of all aspects of Laws Stores, including the technology. The comments included references to laser scanning as 'barking up the wrong tree' (Senior Methods Manager) and PDCs as 'building on sand' (Productivity and Distribution Controller). Describing Laws' technology in general it was said 'there were no controls - no-one was held accountable'. However, these criticisms were not extended to the DP Manager. The Methods and Distribution Controller reported that 'I don't blame him, from his own point of view as DP Manager he was doing OK'. The Senior Methods Manager agreed, 'the

technical systems were good at Laws, I don't doubt the DP Manager's ability from the data processing point of view'. The Head Grocery Buyer, who was critical of Laws' buying system, later reported that,

> 'I had an argument with ... (Laws' DP Manager) over this, but now I understand his position. The DP department only did what it was asked for, if no-one asked for it, they didn't do it'.

The general opinion was that the new equipment and systems were technically sound. If some of them were not satisfactory from an operational standpoint, the DP Manager was not blame as he had fulfilled the requirements of his role.

Not surprisingly, considering the above comments, Wm Low acted quickly to change, or cease operation of, Laws' technology. As already noted, the head office and warehouse systems were transferred to Dundee. The PDCs were criticised by the Productivity and Distribution Controller as,

> 'simply a replacement for the the postal service. They saw the availability of PDCs and then thought what to do with them, when it should have been the other way around'.

The operation of the PDCs was, therefore, altered to bring it into line with the rest of Wm Low's branches. It was used in conjunction with the Stock Labour Inventory Management (SLIM) system. This consists of shelf-edge labels indicating the line code, stock-holding requirement and case quantity. The operator can carry the PDC around the store, calculate the amount of each line required and

key it directly into the PDC. A written record of the order is no longer required.

The operation of laser scanning was discontinued in the two branches shortly after the takeover. The reasons for this were two-fold. First, it was not consistent with Wm Low's policy of introducing laser scanning only into larger stores, which were considered more able to justify the investment. Second, a number of operational difficulties had arisen, particularly with the second installation. These resulted from a breakdown in control and discipline in the store after the branch manager responsible for establishing the system left the company. The criticisms included inaccurate prices held in the price-look-up file, incorrect price tickets on the shelves, goods displayed in the wrong place and lines without barcodes which had not been priced. According to the Productivity and Distribution Controller, 'at the shop there was a file full of complaints from the trading standards authority which no-one was worried about or doing anything to remedy the problems'.

HISTORY OF WM LOW & COMPANY PLC

James Low opened his first grocery shop in Dundee in 1868. He was later joined by his brother, William. In 1871 James Low formed a partnership with William Lindsay and started a preserves, bread and confectionary manufacturing business, Lindsay and Low. In 1879 James Low handed over the running of the grocery business to his brother. Whilst James still retained a small financial interest,

the business became known as Wm Low & Company. The family interest in the firm was further reinforced when William Rettie joined the company. He was married to Anne Low, sister of William and James.

The earliest records of the firm show that in 1881 there were seven branches in Dundee. By the turn of the century there were sixty-four branches stretching from Dingwall to Hawick. In 1917 the partnership between William Low and William Rettie was converted into a limited company which continued to be passed down through generations of both families. Archibald Rettie became Managing Director in the 1920's and was joined by William Low's son, also called William. In 1947, Ian Stewart (grandson of Wm Low) joined the company to be followed by Phillip Rettie (grandson of Wm Rettie) in 1948. These two were joint Managing Directors whilst Mr. Drysdale (another grandson of Wm Low) was Chairman.

In 1963 the company opened its first supermarket and in 1968 it celebrated its centenary year with 48 branches, 16 of which were supermarkets. Family influence in the company remained strong until going public in 1972. Most members of the owning families were not interested in the running of the business and wished to realise their assets and therefore took this opportunity to sell a large proportion of the shares. After going public, 30% of the shares were still held by the family, with P. Rettie and I. Stewart acting as spokesmen for the family interests. P. Rettie was Chairman and Managing Director until 1982 when he resigned his post as Managing Director. He

remained as Chairman of Wm Low, with I. Stewart as Deputy Chairman. The Finance Director then took over as Managing Director. He had been with the company for over twenty years, starting his career as an accountant. P. Rettie continued as chairman until March 1985 when he was succeeded by Prof. C. Blake (Professor of Economics at Dundee University). He was the first non-family chairman, apart from a period during the war when a 'caretaker Chairman' was in charge.

In 1972 the head office and warehouse moved to larger purpose-built premises on the outskirts of Dundee. A freezer centre division, Lowfreeze, was established in 1979 (later sold in 1987). As these increased and the size of supermarkets grew to over 20,000 sq ft, the warehouse capacity doubled and the head office was extended. At the end of the financial year 1983/4 the company operated 45 supermarkets and 16 freezer centres. The average size of supermarket was 11,000 sq ft. The company employed approximately 7000, mostly part-time staff. This included seventy executives and sixty clerical staff at head office, and another two hundred staff based in the warehouse.

ORGANIZATIONAL STRUCTURE

The organization structure was basically functional but, owing to to its larger size, was rather more complex than Laws Stores, with a two-tier board structure. The main board consisted of three non-executive directors (the Chairman, Deputy Chairman, and a representative of the

company's merchant banker) and four executive directors (the Managing Director, Finance Director, Marketing Director and Property Director). The full board met quarterly to discuss strategic finance and investment policies.

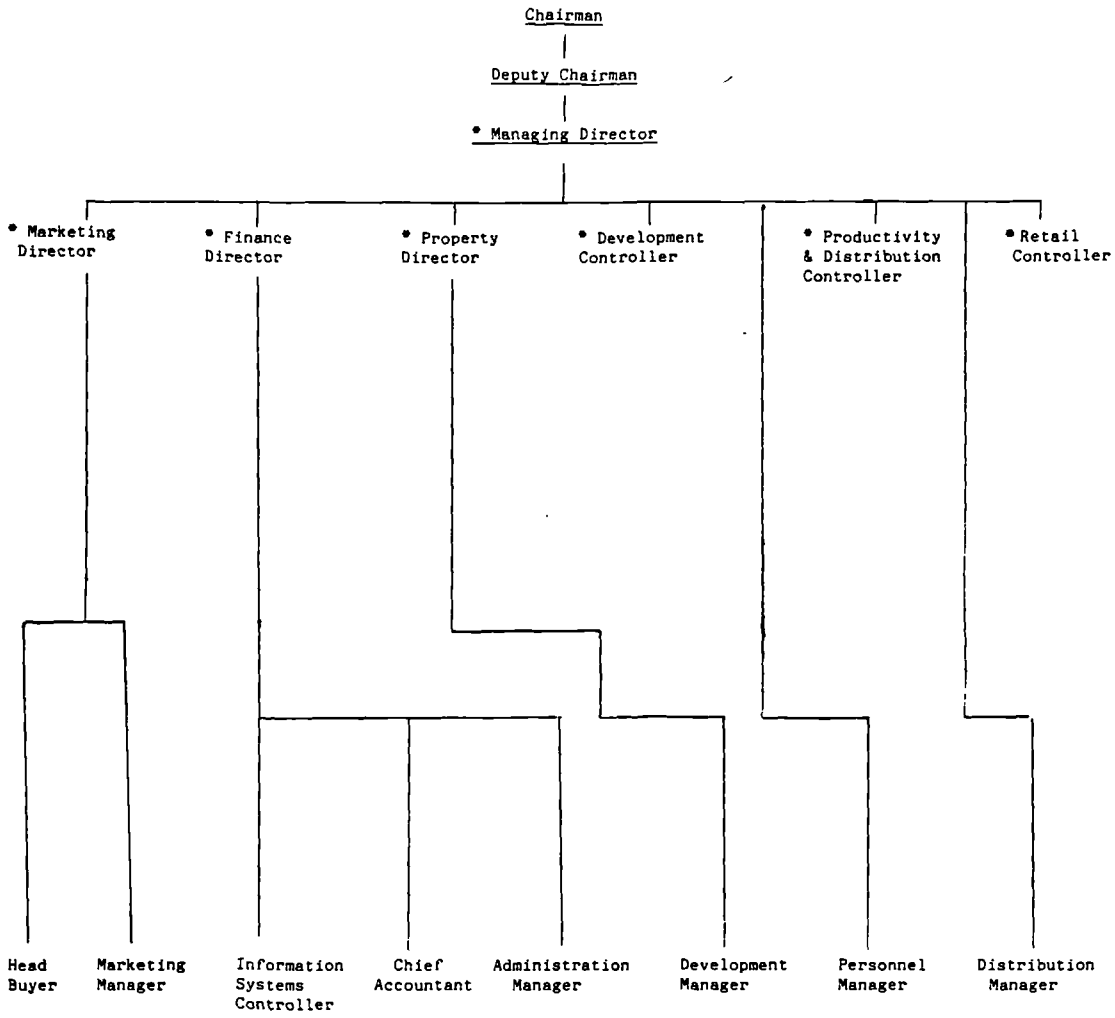
Under the main board was the Management Committee. This was headed by the Managing Director and included the Marketing Director, Finance Director, Property Director, Retail Controller, Development Controller and Methods/Distribution Controller. According to company literature,

> 'The principal operating policy body is the Management Committee which meets weekly. Its members are responsible directly to..... (the Managing Director) for their divisions as undernoted and in turn are responsible for the departments making up that division.'

The company did not have a formal organization chart as job titles and roles were continually changing. However, a chart was drawn up by the Methods/Distribution Controller showing the position in 1985 (Figure 10.1). This illustrates the number of divisions which reported to the Managing Director. The organization structure and the control exercised by the Managing Director will be discussed in greater detail later in this chapter.

Figure 10.1

Wm Low & Co PLC - Senior Management Structure, March 1985



* Management Committee

Non-Executive Directors

Chairman

Deputy Chairman

TECHNOLOGY IN WM LOW - HEAD OFFICE

Computerisation in Wm Low dates back to 1967 when the company purchased its first mainframe computer, an ICL 1300. This was updated in 1973 to a 2900. At this time they also installed PDC's into all their branches. This gave the company a 24 hour order cycle and also provided useful information through the analysis of data that was captured. As with Laws Stores, these PDCs were supplied by MSI. Most of the company's systems dated back to this time, for example payroll, accounting and management information systems. The budgeting and direct delivery systems have been running since 1978. In 1981 an ICL ME29 was installed. On-line warehouse systems were developed which facilitated automatic re-ordering. An additional ME29 was purchased as a backup in 1984. Therefore, when the company acquired Laws Stores in 1985 it had two ICL ME29 processors at head office, four ICL DRS mini processors based in the warehouses and one hundred PDCs in the stores.

The development of the on-line warehouse system was the only major data processing development to have taken place at the head office in recent years. It was introduced in stages over a period of two and a half years, the last stage being completed in 1984. The system development was initiated by the Managing Director who saw it in operation in the U.S. It was developed totally in-house by two senior programmers liaising with the methods department and the eventual users. Briefly, the system, which was very comprehensive worked thus: as orders are received

from the branches they are deducted from the stockfile. When a line requires re-ordering the computer generates a recommended order on the basis of average previous orders, stock held, and orders in transit. This can be either passed or amended by the stock control clerk and then issued as a purchase order to the relevant supplier. A copy of the purchase order is held on file, so when the delivery arrives it can be checked against what was ordered. The computer then indicates where the order is to be stored in the warehouse.

In addition to the ordering and reception of deliveries from suppliers the system also deals with issuing orders to branches. The picking list for each branch order is drawn up in the form of a series of adhesive labels. As each item is picked by the warehouseman, the label is removed from the list and placed on the box. Any labels remaining when the order is complete indicates lines which are out of stock. The benefits derived from the system are the availability of information, increased accuracy and savings in time. Whilst the warehouse system was the most recent major development, investigations by the researcher showed that a few other 'minor' developments had taken place.

One of these developments was the produce buying system introduced in 1985. This is run in conjunction with the operators of Wm Low's produce distribution service, Geest, who intend using the system with other companies after it has been tested with Wm Low. The system consists of a terminal on the buyers desk linked to the Geest warehouse

and to Geest's central computer at their head office in Spalding. The information provided by the system includes: the amount of each product sold, either totally, or by branch; historic information; stock in warehouse and records of deliveries. This information assists the buyer in his purchase decisions.

Another recent technological development at head office was the introduction of ICL One Per Desks (OPDs). These consist of a personal computer with a telephone attached. The facilities include a calculator, telephone directory, telephone answering service, link to PRESTEL, graphics and the possibility of programming in Basic. The Finance Director had ordered ten of these which were allocated to various executives including the Finance Director himself and the Managing Director. The basis for the allocation was unclear. It appeared that the Finance Director used his own judgement as to who would benefit most from personal computing facilities. The Produce Buyer believed he had been given one because he used the telephone a lot. The Management Accountant reported that 'the Finance Director said one day - "go and pick it up" - I don't know what I'm supposed to do with it.' The Data Processing Manager reported that he got one because five boxes appeared in his office one day, each contained an OPD which did not work - 'The Finance Director broke three in ten days.' So the Data Processing Manager was able to assemble one working OPD for himself out of the five broken ones.

Most of those executives that had been allocated an OPD found it of little use. A month after they had been introduced, as far as the researcher was aware, no-one was using them for any purpose other than as a telephone and directory. According to the Produce Buyer, 'it's just an expensive telephone'. The main reasons given for not using the OPD were lack of time, lack of skill, and not being 'computer orientated'. The only executive with any enthusiasm for this new piece of technology was the Chief Accountant. He had recently been recruited and had been allocated an OPD when he took up his appointment. In his previous position he had used a micro-computer frequently, and if he had not been given an OPD he would have requested other personal computing facilities.

IN-STORE DEVELOPMENTS

According to the Retail Controller, the introduction of PDCs in 1973 'totally transformed the company, they made a big difference in lead times and accuracy'. Since then, the branches had seen little in terms of new technology, although two developments were currently being tried in selected branches. The first of these was the Building Management System (BMS). Through this system, all heating, lighting, and refrigeration in the store could be controlled electronically, either in the branch itself, or at head office. The project was initiated by the Technical Services Manager. After opening a new store in Oban, difficulties were encountered with the heating system. The Technical Services Manager had to visit the store on several occasions to rectify the problem.

Frequently the task itself took only fifteen minutes whilst the return journey from Dundee took four hours. Therefore, he began to search for equipment that would allow control of the branch's energy system and fault-finding from head office.

An electronics firm was eventually found which would design the system exclusively for, and in conjunction with, Wm Low. The Technical Services Manager put the proposal to his superior, the Development Controller, who readily agreed. The Development Controller then submitted the proposal to the Management Committee. Further clarification of the system was requested and the proposal was referred back to the Technical Services Manager. The proposal was submitted six times and each time the decision was deferred. According to its initiator, this was because his superior, and thus the Management Committee did not fully understand the implications. Eventually the Technical Services Manager put the proposal to the committee himself and it was immediately accepted.

The system consists of an in-store controller which monitors all aspects of the branch energy requirements. The system reports to the head office controller on an exception basis. If a fault occurs, this is indicated on the screen at head office and a hard copy can be made on the printer. Plans of the branch's energy system showing air ducts, valves, fans, pumps and boilers allow the Technical Services Manager to locate the problem. He can then telephone a local contractor and indicate what is required and which equipment needs replacing. The

benefits accrue not only because of the time saved by the Technical Services Manager but also because the energy requirements of the branches are controlled and run more efficiently. The first store was installed in 1984, in the following year four more were installed and a further twelve were planned. The Technical Services Manager reported that the main difficulty with the project was co-ordinating the different parties involved: the hardware supplier; software design and electrical contractor. He also reported difficulty in explaining the system to some branch managers.

LASER SCANNING

Laser scanning was introduced into one of the company's stores in September 1984. The idea had been under consideration for some time. The Retail Controller reported that it had been discussed at the Management Committee meetings four or five times, each discussion lasting approximately half an hour. He also reported that they decided to install laser scanning because it was 'the in thing to do'. In September 1983, the Senior Methods Manager was told by the Management Committee to proceed with plans for the introduction of laser scanning. The criteria laid down for the choice of store were that it should be close to the head office, large enough and with sufficient turnover to justify the investment and have a 'forward thinking', and stable management team. Only one store fitted these criteria.

The Senior Methods Manager, who had responsibility for the introduction of laser scanning, headed the Organization and Methods department. The role of this department was to act as an 'internal consultancy' streamlining the company and cutting costs. They developed systems mainly for the distribution services and retail operations, and considered themselves a 'task force' moving from project to project as dictated by the Management Committee, which in turn was 'kicked into shape' by the Managing Director.

The Senior Methods Manager began by having discussions with the existing checkout supplier, Sweda. He reported that,

> 'The Managing Directors of both companies (Sweda and Wm Low) were very friendly, so there was just one bit of paper outlining the agreement, with a clever clause written in so Wm Low could pull out at any point.'

Sweda set up a project team to work on Wm Low's specifications. However, some months into the project it became apparent that the Sweda laser scanning equipment would not communicate with the ICL mainframe. Therefore, Wm Low terminated the agreement with Sweda. A further review of laser scanner suppliers was undertaken. Through personal contacts the Senior Methods Manager became aware that an ICL laser scanning system had been developed with J. Sainsbury. After reviewing the system, Wm Low decided to purchase it. According to the Senior Methods Manager the system was 'very soft' and could therefore be programmed to Wm Low's requirements. He believed that the supermarket company must be able to define the system to

the equipment supplier. The company must know why it wants to go into scanning and how it will use the information. Wm Low were able to define their future requirements and 'put ICL through hell trying to design the system'. For example, as Wm Low required duplicate files to be held in the store, ICL had to build the stock control system into scanning. This meant that each barcode had to be linked with an in-house order code which was used for branch charging.

Eight months prior to the installation, the Grocery Manager at the designated store was told that he would be 'Project Leader' for the scanning development. He visited the head office for a briefing by the Senior Methods Manager. The branch staff were informed approximately six months before the introducing the technology and attempts were made to reduce any fears that they might have.

The Project Leader spent the next six months building up the files that were required and adding new lines or deleting discontinued ones. The change from Sweda to ICL caused extra work. The product descriptions were originally a maximum of twelve characters long but, after the change, up to sixteen characters could be used. The Project Leader reported difficulty in 'educating staff' and also suffered some stress. As the 'live' date grew closer and it became apparent he would not have the file created in time, he was given extra assistance. The central processing units and two training tills were installed two months prior to going on-line. Each checkout

operator had 20 half-hour training sessions on the new equipment.

The system that was installed consisted of sixteen laser scanning checkouts. This was reduced from eighteen traditional checkouts in anticipation of an improved checkout flow and in order to justify the investment. At the checkout, goods could be scanned, the price entered or a velocity code entered (used for products which did not carry a barcode, such as oranges). The weighing scales on the meat, delicatessan and produce departments produced barcodes which could be attached to the weighed item. Therefore, a high percentage of items could be scanned. A printout for December 1984 shows that 86% of items were scanned on that day.

Two central processing units were located in the administration office. One of these supported the sixteen checkouts, the other acted as backup and processed the information for three workstations and a printer. One workstation, located in the Manager's office, was used for producing reports on sales history (either by line or commodity group), supplier or checkout details. The workstation in the administration office had facilities for price changes, adding and deleting lines. The cash office workstation was used for cash reconciliation and issuing change.

Initial operation of the laser scanning checkouts caused some problems. Despite having extensive training, the part-time operators were unaccustomed to operating laser

scanning in a 'live' situation. During the first few days long queues formed at the checkouts, increasing pressure and further harassing the operators. Frequent apologies were made by the management over the store public address system and 'compensation' was offered to customers in the form of two free game cards. Understandably, customer reaction was reported to be 'mixed' by the Project Leader. The difficulties at the checkout were not solely because of slow operators. As with Laws Stores, problems were encountered with some barcodes which would not scan properly. Therefore, a 'bad barcode list' was drawn up and these items were taken out of the system.

The Senior Methods Manager was impressed by a report on checkout productivity which he thought had been written by the Data Processing Manager at Laws Stores (it had actually been produced by the Personnel Director). This showed, graphically, the drop in checkout throughput immediately after the introduction of laser scanning. This trend was followed by a steady increase as operators became more proficient and poor barcodes were identified, and then later levelled out. The Senior Methods Manager noted that if this report had been available at the time they were planning laser scanning it would have enabled them to anticipate some of the pitfalls.

To help rectify the problems an additional checkout was installed. After the initial difficulties, throughput improved and the customers returned. In May 1985, nine months after the introduction of laser scanning, average throughput had risen to 24 items per minute, with some

operators reaching 28 or 29. The first operator to reach 30 items per minute was rewarded with a box of chocolates! Most operators seemed happy with the new technology with a few complaining of an aching arm.

The Cash Office Supervisor had some reservations about the new system. These stemmed mainly from the implementation stage, when she had to establish the new system and train subordinates, whilst still maintaining the old system. She reported that the initial operation of the system was 'chaos'. She requested some changes which improved the system. Nine months later, however, some changes were still outstanding. The Superviser reported that the system created more work, and extra staff had to be employed in the cash office, but she did not wish to revert to the old system.

The Senior Methods Manager continued to monitor the progress of the laser scanning store. Further changes to the system were planned, but these had been delayed because of the takeover. A formal evaluation of the laser scanning project would be undertaken in the future. The costs would have to be justified in terms of the hard benefits, although additional soft benefits were also expected to accrue. At the store, the Project Leader identified the benefits as being improved checkout throughput, reduced shelf-filling staff and the itemised till receipt.

FUTURE TECHNOLOGICAL DEVELOPMENTS AT WM LOW

The DP Manager at Laws Stores was the only executive to move to Wm Low's head office in Dundee, where he became Information Systems Controller. This new position reflected the increasing importance which the company was placing on data processing and the developments it wished to make in this area.

Even before the takeover, the company had identified a need to review its data processing requirements. This was the result of recognising that they were behind developments in other companies and pressure from within the company itself. These pressures came from inadequacies in existing systems, for example the fixed asset register and the purchase ledger, and the requirements for increased information, particularly from the marketing department. The rapid growth in the company's size following the takeover reinforced the need for technological developments. The Information Systems Controller identified the particular problems faced by Wm Low when he was appointed:

(a) the systems were labour intensive;

(b) information was not sufficient or timely;

(c) there was no room available for expansion.

He acknowledged that the systems were efficient but that the computer installation had not developed at the same rate as the company and things had become 'out of balance'. He saw his new role as being 'to develop the DP strategy over the next few (two to five) years'.

Prior to the appointment of the Information Systems Controller, a Consultant had already been engaged to undertake a review of the systems. He began his investigations by talking to representatives from each department, usually the most senior member. He identified the 'inputs' and 'outputs' of each department and asked what improvements they would like to see in the systems. He noted four types of request:

(a) 'tweaking' - minor improvements to the system;

(b) totally new systems where none existed;

(c) general requests for 'on-line' information;

(d) others, for example a reduction in the work being manually keyed-in to the system and double-checked, word processing.

At this point the Information Systems Controller took up his position in Dundee. He identified three stages in the development project:

(a) 'fact-finding' - this had already been undertaken by the Consultant;

(b) planning the future data processing strategy and presenting it to the Board;

(c) implementation of the strategy.

The next stage, therefore, was for the Information Systems Controller and the Consultant to work together on planning a strategy and presenting it to the Board. The Information Systems Controller outlined three alternative ways of doing this: a short, sharp study; a complete review; employment of an outside agency to undertake the review. According to the Information Systems Controller, the users were already anxious and the second and third

options would only have 'dragged out the pain'. Therefore, the first option was chosen, a short, sharp study lasting ten weeks. He saw the collaboration with the Consultant as an advantage as it 'added weight' to the proposals. 'They were not just coming from within, from someone with a vested interest, but from someone who was independent'.

The only guideline provided by the Board was that the company should continue with its current computer supplier. They were satisfied with the service from ICL and to change at this stage would have caused too many problems. The Information Systems Controller reported the major difficulty in drawing up the DP plans was that 'there's no corporate strategy, at least not one that is articulated. Those at the top, especially the Managing Director, know where we are going, but those below are working blind'. No cost ceiling had been specified by the Board as they felt that to impose a maximum expenditure would place a constraint on the plans. In addition, it would encourage the Information Systems Controller and the Consultant to spend up to the limit. Nevertheless, they were working under implicit, albeit wide, cost parameters. According to the Information Systems Controller, £2 million was unlikely to be sufficient, but they would not submit proposals costing £10 million as they knew this would not be acceptable.

The final proposals and costings were submitted to the Board at the end of September 1985. The Information Systems Controller outlined the proposals to the researcher in the same way in which he presented them to

the Board. The recommendations were classified under six headings: hardware; building and services requirements; software and systems development; departmental staffing; documentation standards; authorisation procedures.

a. Hardware. Having decided to remain with ICL, the company was faced with two alternatives - proceeding with its existing equipment or using new equipment. The existing equipment was judged not to have a viable future being somewhat outdated. In addition, it offerred no cost advantage and had large physical and maintainance requirements. ICL had recently brought out a new range, the series 39, which included a system of suitable size and price. The Information Systems Controller recommended that this system should be purchased, despite the fact that it was so far unproven.

The head office system configuration would consist of a series 39 twin node mainframe (ie two central processing units, one of which would be used as a backup), plus another series 39 machine to be used for development projects. Linked to the twin node mainframe would be terminals located in all user departments, plus the ICL OPDs and word processing facilities. Additional links would be provided to the mini-computers in the depots, to outside suppliers and to mini or micro-computers in the branches. Dependent upon a favourable evaluation by the Methods Department, laser scanning would be introduced into all stores over 20,000 square feet. Laser scanning in smaller stores had not been ruled out and this would be

investigated at a later date. This proposal was presented diagrammatically to the Board as in Figure 10.2.

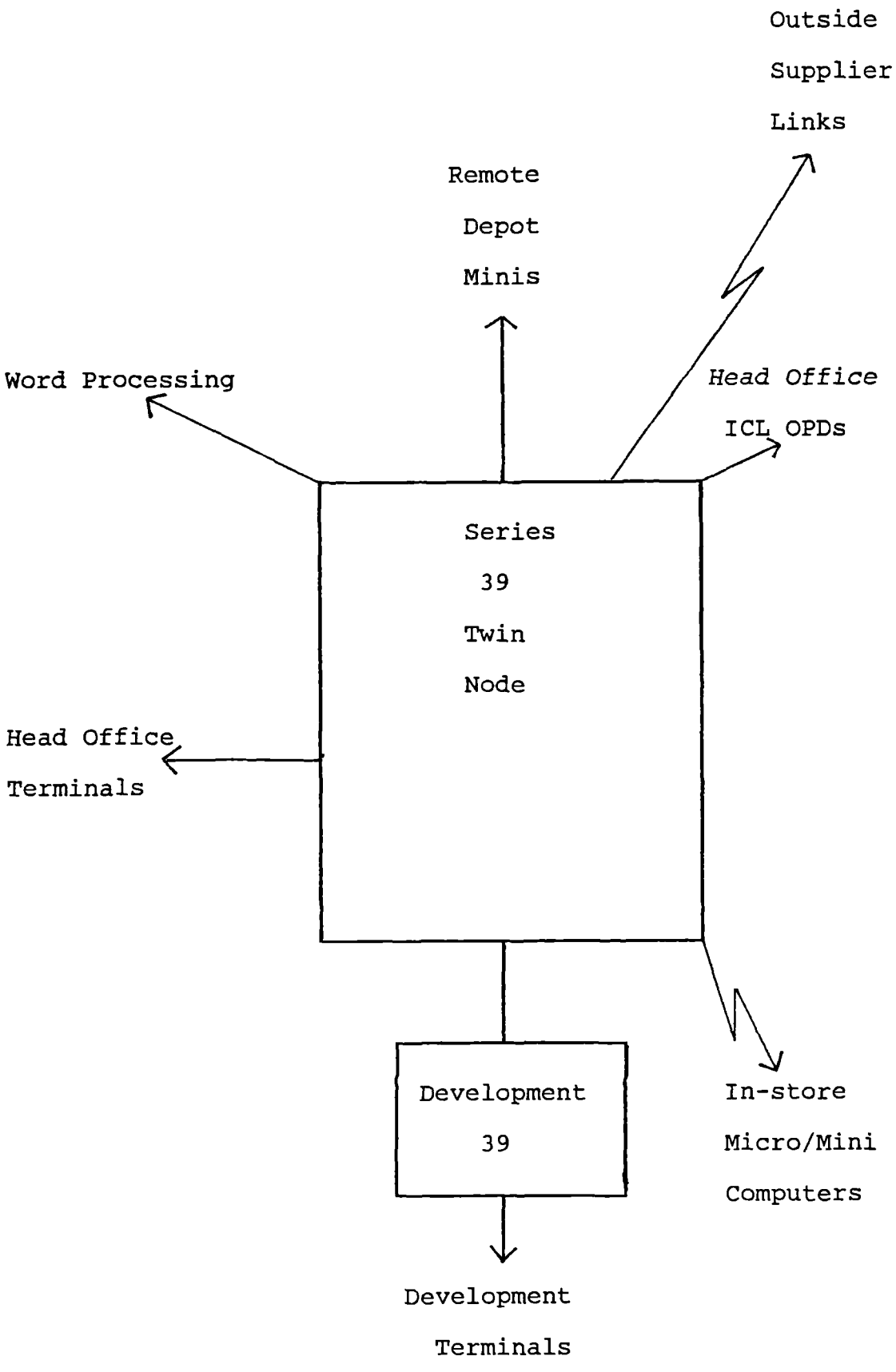
b. Building and Services. Owing to the limited space at Wm Low's head office, another building was purchased approximately a mile away to house the new data processing facilities. However, this was later found not to be feasible as the communication cables necessary to carry the vast amounts of data between head office and the new site had not yet been developed. Consequently, the Projects Department moved to the new building and the existing computer room was extended to three times its previous size. Other factors which had to be taken into account were the electrical supply and the air conditioning. The total cost of the building and services requirements amounted to £90,000.

c. Software. Recommendations were made concerning the operating system, database and programming language to be used. Proposals were also submitted relating to the areas of the business to be developed and the purchase of suitable packages.

d. DP Department Staffing. A total staff of 39 was proposed for the Data Processing Department, the structure of which is shown in Figure 10.3. The incumbent DP Manager at Wm Low became Special Projects Manager with responsibility for 'one-off' projects, personal computing and word processing. He was also responsible for the internal audit which the Information Systems Controller described as 'spying' on the analyst programmers to ensure

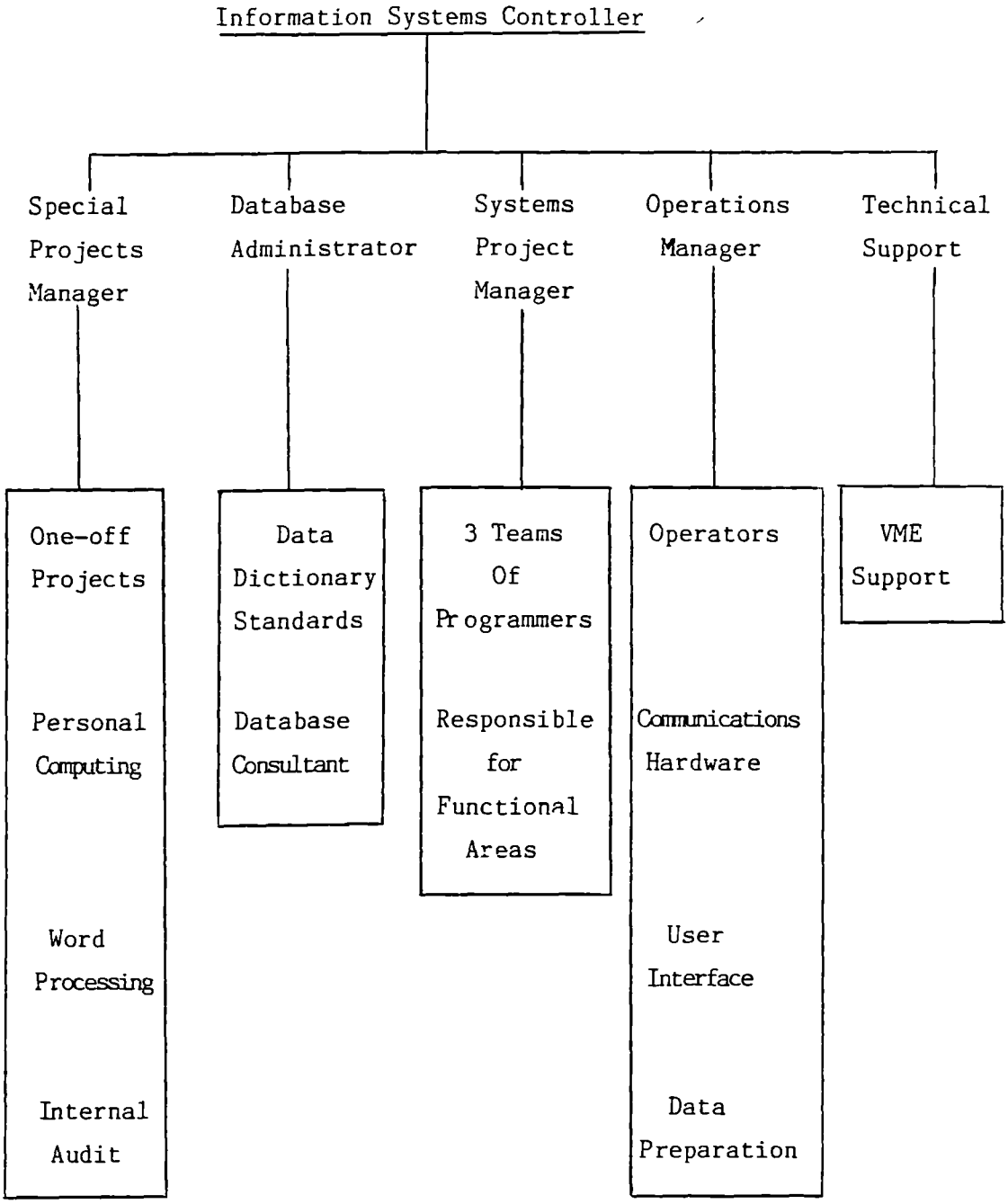
Computer Configuration

Figure 10.2



DP Department Structure

Figure 10.3



that they were working to full capacity. The other managers were promoted internally or recruited from outside where necessary.

The three teams of analyst programmers were divided functionally, for example one team to deal with Finance /Accounts, another with Buying/Marketing, to enable them to develop specialisms in these areas. An additional 'pool' of eight analyst programmers was also requested.

e. Documentation Standards. As the proposals were dependent upon on a database system, recommendations were made concerning documentation standards and a database dictionary. Different teams would be working on separate programs which would eventually interface and be accessed by a variety of departments. Therefore, it was necessary to standardise procedures. The data dictionary would define the terms to be used and thus avoid inaccuracies and inappropriate use of the terms.

f. Authorisation Procedures. Four levels of authorisation were proposed. These were:

(1) projects requiring up to one man week's work - Special Projects Manager;
(2) up to six man weeks' work - Information Systems Controller;
(3) up to 12 man weeks' work - Finance Director
(4) over 12 man weeks' work - the DP Committee.

The DP Committee consisted of the Managing Director, Finance Director and Information Systems Controller. It was established by the Managing Director in a manner

similar to other committees set up to discuss particular areas of the business, such as transport and wages. This authorisation procedure was used only for manpower requirements. Capital authorisation was dealt with separately, either by the Board or the Management Committee, depending on the sum required. The total capital expenditure involved in the above proposals amounted to £1.7 million.

The Board of Wm Low agreed to most of the proposals, with discussion focusing on two areas, authorisation and staffing. The authority levels caused controversy because some members considered it an erosion of their power. It was not apparent who objected to the procedure, but previously all decisions had been taken by the Managing Director. Nevertheless, the authorisation procedure, as laid down in the proposals, was agreed to. The Information Systems Controller later pointed out that in reality the Managing Director and Finance Director could be excluded from the authorisation procedure because all large projects could be broken down into individual smaller projects of less than six weeks.

According to the Information Systems Controller, the staffing of the DP Department was a 'contentious issue'. He described this as the only proposal which he 'lost' and which was subsequently changed. In particular, the pool of eight programmers originally requested was cut to three. The pay and benefits for DP staff also caused problems because of the need to remain within the company's grading system. The DP Manager believed that

this would not be sufficient to retain the computer specialists for any length of time. The allocation and type of company car was also strictly controlled by grade, so these could not be given as an incentive. The Information Systems Controller requested that all five managers within the department be given cars, but this was only granted to two.

Having agreed to the proposals, with the reservations mentioned, the plans were announced to the rest of the company. This was done in a document written by the Finance Director and circulated to executive directors, executive staff and branch managers. The report, on 2 October 1985, was entitled 'Information Processing Strategy'. Little detailed information was supplied in the short report, but an indication was given as to the extent of the changes that would take place.

> 'The technology behind our existing systems is out of date. With this new equipment we will transfer, convert and enhance our existing systems as well as bringing on entirely new systems. This will impact not only at head office but also at branches. The new systems will have greater user involvement in the departments where the systems and information are most required. There will be extensive use of screens and VDUs and communication links are likely to be established across the company for the transfer of information'.

The implementation of these changes, which started in January 1986 and were expected to last for two years, were outside the scope of this research. Nevertheless, the technology that had been introduced over the previous twenty years and the above proposals for future developments provided sufficient evidence for comparisons to be drawn between Wm Low and Laws Stores.

SUMMARY

This chapter has shown the origins of Wm Low as a traditional, family-owned supermarket chain based in Scotland. In 1967 it purchased its first computer, an ICL mainframe. The company went public in 1973 and continued its technological developments with the upgrade of the mainframe and the installation of PDCs in all the branches. Over the next 12 years, the company continued to improve its data processing facilities. This included the computerisation of all head office and warehouse systems, the use of micro-computers and the introduction of laser scanning into a trial store in 1984.

In January 1985 Wm Low purchased Laws Stores. This doubled the number of branches operated by the company and extended the trading area into the North East of England. Following the takeover, major changes were made to the technology in operation in Laws Stores. First, all head office and warehouse systems were transferred to Wm Low's computer. Second, changes were made to the operation of the PDC units in the branches and third, they ceased operating laser scanning in the two trial stores. In

addition, major changes were proposed for the data processing facilities at Wm Low to enable it to accommodate the increased turnover and take advantage of recent developments in microelectronics.

11. LAWS STORES AND WM LOW: A COMPARATIVE ANALYSIS

Chapter 10 provided background information on Wm Low in terms of its history and structure. More detailed information was given on the computer developments that had taken place over the last twenty years and those which were proposed for the future. This chapter summarises the similarities between Laws Stores and Wm Low. It then analyses the introduction of technology into Wm Low using the technology, strategy and process framework used earlier. The aim of the chapter is to highlight the different approaches taken by the two companies and show the implications these had for computer developments.

HISTORICAL DEVELOPMENTS

Historically, there were many similarities between Laws Stores and Wm Low. Both were family-owned firms and, until recently, family members had taken a prominent role in the management of the company. Both companies were established around the turn of the century and had, at times, been prosperous and the leading supermarket chain in their respective regions. In the 1960s both chains followed the industry trend and opened their first supermarkets. However, from about this time the similarities began to decrease.

Wm Low continued to grow and prosper by closing their smaller stores and opening larger ones, whilst Laws Stores failed to adapt. Wm Low also decided to go public which

enabled them to have access to greater funds for investment and expansion. Most significantly for this research, during the 1960s Wm Low invested in computerisation which they progressively upgraded over the following years and added to with other forms of new technology such as PDCs. By comparison, Laws Stores failed to invest in computerisation, choosing instead, to contract out their DP requirements to a bureau. Consequently, when they decided to introduce new technology almost twenty years later than Wm Low there existed a large 'cultural gap' to overcome without any in-house expertise or experience.

The similar historical development of Laws Stores and Wm Low is summarised in Table 11.1. There are, however, major differences in terms of technology, strategy and organizational processes which will now be studied in greater detail.

TECHNOLOGY

A major contrast between the two companies was a question of time span. Wm Low had 18 years experience of computerisation. Most of their systems were well established and reliable. According to McLoughlin's (1985) categorisation, they had been undergoing 'routine operation' for a number of years. Laws Stores systems were relatively new, many were still in the initial operation phase and were continually being developed and refined. They were, by no means, infallible.

Laws Stores and Wm Low: Summary Comparison — Table 11.1

ASPECT	LAWS STORES	WM LOW
Historical Development		
- first store	1907	1868
- rate of development	1960 = 51 branches	1968 = 48 branches
- first supermarket	1959	1963
- ownership	private	public
- family influence	very strong	strong but decreasing in the 1980's
- basic structure	functional	functional
- initial computerisation	1982	1967
Technology		
- experience of technology	2 years	18 years
- phase of development	initial operation	routine operation
- DP profile	high	low
- input mode	on - line	batch
- innovators/motivators	DP department	Methods department
- company's perceived power	low	high
Strategy		
- rate of change	rapid	slow
- system development	packages bought-in	in - house
- size of DP department	small	relatively small
- user involvement	high requirement	low requirement
- degree of refinement	low	high
- willingness to pioneer	generally low	low
- strategy formation	emergent	emergent
Organizational Processes		
- flexibility	little	some
- horizontal communication	poor	good
- vertical communication	good	extended
- commitment to new technology	low	unable to ascertain
- level of conflict	high	low
- power of DP Manager	high	low

Different approaches had also been taken by the two companies in the design of the systems. Virtually all Wm Low's systems had been developed in-house by the company's own team of programmers. The disadvantage of this approach was that it took a long time, according to the Senior Methods Manager 'too long'. Nevertheless, it did ensure that the technology was tailored exactly to the company's requirements. As described in Chapter 7 almost all Laws Stores systems had been bought as packages. Whilst this had the advantage that a large number of systems could be introduced in a short space of time they rarely fulfilled the requirements of the users. The DP Manager insisted that, given time, they would have been 'perfect'. However, there was a tendency to amend only those packages that were particularly inadequate or where the users were most vociferous in their demands. The DP Department then moved on to new developments, such as laser scanning, whilst many users were still working with unsatisfactory systems.

At the time the research was undertaken, 1984/5, a very striking difference between the two companies was the importance attributed to technology. At Laws Stores, it experienced a very high profile, the researcher could question anyone in the organization (including the canteen assistant) and receive a lengthy response on their attitudes, opinions and personal experience of the company's new technology. Whilst at Wm Low even many of the managers interviewed were unable to report any personal experience of, or attitudes to, the company's technology.

The major reason for this was that at Laws the technology was relatively new and therefore very topical. Everyone, except the most recent recruits, could remember its installation, which as already described, was quite traumatic and contentious in some cases. In addition, Laws' systems were on-line and user driven, ensuring that almost everyone in the company had direct contact with the technology through the use of VDUs. Furthermore, despite the fact that Laws had been late in adopting new technology, two years after its introduction virtually all departments in the company had been covered.

By comparison, at Wm Low most systems had been established many years ago. They were generally accepted as part of routine company operations. In addition, the ICL equipment used batch processing, so the nearest most members came to technology was through a computer printout. The notable exceptions to these generalisations were the technological developments which had recently taken place: the building management system; the produce buying system; the ICL OPDs and laser scanning. Whilst these were in themselves significant developments they had so far had little effect on the organization as a whole. They were largely ad hoc projects, isolated from each other and dispersed throughout the company.

This raises the next question of who was the motivating force behind technological change in the respective companies? Earlier chapters demonstrated that in Laws Stores this was the Finance Director and DP Manager. At Wm Low, the initiators were not quite so easy to identify.

When the new Information Systems Controller was questioned on this matter, he replied that he could only answer negatively, 'it definitely isn't the DP Department'. The Distribution and Methods Controller agreed, 'operational innovation comes from the Methods Department, not from DP'. The Senior Methods Manager, however, suggested that,

> 'we're not innovators, we just think innovatively, led by the Management Committee or the MD.... Line management don't have the time to review their methods or systems, so we're the DP user representatives for the operations area'.

The Methods Department's main involvement centred on the distribution and retail areas of the business rather than head office. The most recent developments in other departments, such as the building management system and the produce buying system, would seem to suggest that innovation came from within the departments themselves or, in the case of the OPDs, from a director. As some departments, and individuals within those departments, are likely to have a greater tendency to innovate than others, this would explain why developments at head office in recent years had tended to be isolated and ad hoc.

A further contrast between the two supermarket chains related to their size and perceived power. Wm Low ranks 14th in terms of supermarket turnover in the UK (Taylor 1985), but in Scotland where it has an 11% market share it is a very important company, particularly from a suppliers point of view. This is also true of the supplier of it's

computer equipment ICL, as Wm Low are one of their largest Scottish clients. ICL have for some time been attempting to become a major supplier of retail technology. In 1982 they 'took the major strategic decision to make a long term commitment to the retail market'. They established a Retail Business Centre and, by 1985, were reported to have a 25% share of the EPOS market (ICL 1985). To be able to secure a contract with Wm Low who, after the acquisition of Laws operated over a hundred stores, and were expanding at the rate of six stores a year on average, would give them a significant boost in the market for EPOS equipment. Wm Low recognised their importance as customers and were able to exploit it to their own advantage. This was illustrated by laser scanning, as the Senior Methods Manager reported 'we put ICL through hell trying to design the system'.

In contrast, Laws Stores regarded themselves as being in a disadvantaged position in relation to their equipment suppliers. Documentary evidence showed that they did not always receive a satisfactory service from IBM. These include such comments as,

> 'major concern was expressed about the ... support likely to to be available during 1983' (minutes of the Project Meeting 26 January 1983).
>
> 'we are still not happy with the level of field support being given in relation to both the hardware and software products' (memo from the Finance Director 31 March 1983).

In addition, when reporting on a visit to the USA arranged by IBM, the Finance Director noted, 'the meeting was badly arranged ... IBM was very disappointing ... the major IBM development centre which we were not allowed to visit'. Laws Stores lack of confidence in their own ability was commented on by a representative of one of the laser scanning equipment suppliers, 'to a certain extent they have to be led through the system more than other companies'.

Memos written by the Finance Director on the subject of laser scanning suggested that Laws Stores were under some kind of obligation to the equipment suppliers, 'a lot of help and support had been given by such people as ADS and it was important that once the pilot schemes have been evaluated we make an early commitment'. This was despite the fact that in both cases Laws were using previously untried equipment and the suppliers were able to bring potential customers to the site to view it in operation. Thus, it could be suggested that Laws were not in such a disadvantageous position, as the suppliers themselves were benefitting from Laws' willingness to pioneer.

STRATEGY

Historically, technology in Wm Low can be divided into three phases:

(a) 1967-1981. This phase began with the introduction of the first, and subsequent, ICL mainframe computers. It included the design and installation of the major systems

(budgeting, payroll and accounts) and the use of PDCs in the branches.

(b) 1981-1985. The major technological change during this phase was the warehouse system. Other developments included the produce buying system and the ICL OPDs. In-store, the major project was the laser scanning installation, plus the building management system.

(c) 1985 Onwards. These most recent developments included the appointment of a new Information Systems Controller and the purchase of ICL hardware. This would cost, according to the Finance Director, 'well in excess of £1.0 million, plus a substantial increase in the number of personnel in the Data Processing Department'. The exact nature of the change in the systems was not specified, but he did suggest that they would have greater user involvement and would impact not only at head office but also at the branches.

Each of these periods will now be examined in turn and later analysed to identify the factors which influenced these developments.

(a) 1967-1981. The reasons behind the introduction of new technology in the first phase were difficult to identify because of the time lapse involved. It could not be ascertained whether an 'intended strategy' (Mintzberg 1978) was formulated and articulated from the outset. The strategy identified retrospectively was in stark contrast to that which emerged at Laws. In Chapter 8 this was

noted as consisting of six inter-related 'policy decisions', which can be compared with those at Wm Low.

1. The overriding principle at Laws was that the technology had to be introduced quickly. At Wm Low twenty years previously it was unlikely that the company felt 'left behind' technologically, nor was faced with any of the environmental pressures which Laws perceived as being important in the 1980s. Therefore computerisation could be introduced much more slowly.

2. The second principle at Laws was that because of the time constraint systems had to be bought in as packages. As no such time constraint existed at Wm Low, systems were developed in-house. More significantly, it is probable that at the time, the company had no option but to design its own systems as suitable packages may not have been available.

3. Both companies were similar in that they operated with a small DP Department. This was possible at Wm Low, despite the relatively large size of the company and the efficient and reliable systems, because of the long time period over which they had been developed. Although at Wm Low, because of the different type of computer equipment in use, a larger number of operations staff were required.

4. At Wm Low, in comparison to Laws, the systems did not require a great deal of user involvement. This was for two reasons. First, programmes operated in batch mode and therefore all information was input by the data

preparation staff. Second, a positive step seems to have been taken to remove the responsibility for systems from the end users. This was indicated by the establishment of the Methods Department in 1969 and the comments of the Senior Methods Manager.

5. The fifth principle at Laws was 'to get things up and running and add the refinements later'. At Wm Low the systems were subject to extensive testing and were relatively reliable before being put into 'live' operation. Although, where necessary, refinements could be added later.

6. A further policy decision at Laws was not to pioneer, but in practice this was not always upheld. Similarly, at Wm Low the company appeared not to pioneer. Nevertheless, it monitored the developments of competitors closely and, once new technology had been proven elsewhere, it was quickly adopted. This is demonstrated by its relatively early entry into computerisation and PDCs.

(b) 1981 - 1985. Little evidence could be found to indicate the strategy underlying this period of technological development. The major project, the warehouse system, was a continuation of the long term developments in the previous phase and followed the same principles. Other projects appeared to be ad hoc and without links to any other areas of the business. This was in contrast to the policy at Laws where all DP systems were interlinked. Nevertheless, most of these developments at Wm Low had clearly defined objectives. The potential

benefits had to be investigated and the investment justified to the Management Committee. The only exception to this was the introduction of the ICL OPDs, which appeared to have no objectives and for which few benefits could be identified by the respondents.

Therefore, for this phase there was no intended, long term, overall DP strategy linking the different elements. However, as time progressed it is likely that a strategy would emerge to enable these projects, such as laser scanning and OPDs, to interface with the developments taking place in the next phase.

(c) 1985 Onwards. The decision to introduce new technology at this stage was prompted by both internal and external factors. Externally, the company was aware that its hardware capabilities were behind the latest technological developments and those being adopted by other companies. Internally, it was pressured by a need for greater and more timely information. In addition, there was limited room for expansion on the current hardware to allow it to accommodate the company's increasing size.

After agreement had been reached at board level to introduce new technology, the Information Systems Controller was brought in to, in his words, 'develop the DP strategy over the next few years'. Other than the requirement to use ICL equipment, no other guidelines were provided by the Board. The Information Systems Controller, assisted by the Consultant, was free to develop a strategy without any constraints on time, cost

or other resources. Whilst this may be considered an advantage and an encouragement to initiative, it nevertheless created a degree of uncertainty. As the Information Systems Controller himself explained, he was working 'blind' and had not been in the company long enough to be able to anticipate what was in the minds of the Managing Director and the rest of the board.

The strategy which was submitted for board approval consisted largely of hardware and technical requirements, for example the equipment to be used, operating system, building and services. In addition, it also dealt with the internal details of the DP Department: staffing; structure; standardisation and controls. The proposals did not include the way in which the technology would be introduced, the effect on, or the involvement of, the user departments. Although staff were informed of the developments in a memo entitled 'Information Processing Strategy', no specific details were provided.

The Concept Of Strategy. In each of the three time periods outlined above, no explicit reference was made to the principles or objectives governing the introduction of new technology prior to the decisions being made. In terms of strategy, or rather the lack of it, there are similarities between Wm Low and Laws Stores. In both companies there were no clearly defined objectives for new technology and a comprehensive strategy was not formulated and articulated at the outset. Instead, it evolved as a result of decisions taken at the various stages during the introduction process. Evidence from Wm Low lends further

support to Mintzberg's (1978) view that strategies emerge as the result of a series of decisions rather than being formulated in advance. This contradicts Chandler's (1962) definition of strategy as 'the determination of the basic long-term goals and objectives of an enterprise, and the adoption of courses of action and the allocation of resources necessary for carrying out those goals'. The factors likely to influence the 'emergent strategy' are discussed in the next section.

ORGANIZATIONAL PROCESSES

As with Laws Stores, Wm Low was formally organized into functions, with department heads responsible for Finance, Administration, Buying, Personnel, and Branch Operations. In reality, however, the structure was more flexible, with roles and titles changing in response to the needs of the company and the environment. Horizontal communication did not appear to be to problematic, but vertical communication was occasionally criticised by respondents. There were six or seven hierarchical levels between the Chairman and shop assistant which created a somewhat extended hierarchy, due to the larger size of the company. As already described, company systems were sophisticated and reliable. All methods were standardized and documented in procedure manuals. Close control was exercised, particularly in the stores, through line management.

These features would seem to suggest that the structure of Wm Low was in some respects organic and in others

bureaucratic. However, when questioned on this matter (using the interview schedule in Appendix H), most respondents viewed it as definitely bureaucratic, whilst others saw it as a combination of bureaucratic and functional. This reflects the strong position and decision-making power held by the Managing Director, which was identified by many respondents as being a major feature of the company. This power was illustrated by the number of departments he had reporting directly to him and by such comments as, 'you can't change your mind around here unless he says so' and 'the Managing Director decides everything anyway'.

Communication. Horizontal communication was achieved by what the Senior Methods Manager termed 'lateral gangplanks' and through numerous committees. The most important of these was the Management Committee, on which all divisions were represented and which acted as a forum for discussion of all operational aspects of the business. These committees provided an opportunity for members to submit, and give their opinion on, proposals, although it was recognised that the final decision rested with the Managing Director. No comparable committees existed within Laws Stores where proposals came mainly from the Chairman and his son, except in the case of new technology where they came mainly from the Finance Director and DP Manager. The DP Project Meetings were only a temporary measure. They did not act as an open forum, but provided just ten minutes for each group to report back on their respective projects.

Evidence showed that the Management Committee at Wm Low had previously been used for discussion of new technology decisions, for example the building management system and laser scanning. Whether or not this would continue to be the case for the major developments initiated in 1985 is debatable. It is possible that the new developments would be driven by the DP Department (rather than the Methods Department, as had frequently been the case previously) and the DP Department did not have a direct representative on the Management Committee. In principle the DP Committee had been established to perform this function but, in reality, the Information Systems Controller was able to bypass this procedure.

Commitment. Chapter 8 noted that lack of commitment to technological change was a major problem in Laws Stores. In Wm Low, many departments did not have any direct involvement with DP Developments and therefore this issue did not arise. Where user involvement was necessary, considerable time was taken to design the systems according to their needs and introduce the technology slowly. For example, the warehouse system was developed in-house and introduced over two and a half years; the Building Management System was designed by an electronics firm in conjunction with Wm Low in response to a specific need identified by the Technical Services Manager; the ICL laser scanning system was adapted to the precise requirements of Wm Low and introduced over six months, with two months spent training checkout assistants.

At Wm Low the systems requirements were identified first and then the technology used as a vehicle for the systems. This contrasts with the Laws approach of buying software packages, installing them quickly and then tailoring them to the company's needs. As a result of the approach taken at Wm Low, users recognised the need for new systems, the change was slower and less traumatic and the technology more easily accepted. The only exception to this was the introduction of the OPD's. These were introduced without any need being identified and without any explanation. Consequently, those assigned an OPD were not committed and rarely used them.

Conflict. There appeared to be little conflict at Wm Low, frequent reference was made to the strong 'one company' feeling. This was equally true of technology which was rarely seen as an important issue for debate. The well established systems had been introduced gradually, they were now recognised as efficient and generally accepted without question. Recent developments tended to be isolated, but where co-operation between departments was required, no conflict was reported.

This lack of conflict could largely be attributed to the nature of the organization structure and the way in which the technology was introduced. The Productivity and Distribution Controller reported that in the Methods Department 'we work hand in hand with the DP Department and the branches, but at Laws they had the systems imposed on them'. A further advantage of this approach was that the Methods Department was not seen as having a vested

interest. This was clearly a contentious issue at Laws, with frequent references to 'empire building' and 'trail blazing', those responsible for DP development were thought by others to benefit from the introduction of new technology. The stated aim of the Methods Department was to design efficient systems, regardless of technology and therefore could not be subject to such accusations. Furthermore, the members of the Methods Department appeared to have a more open attitude than the DP staff who, in previous chapters were noted as being insular and poor communicators. The Productivity Controller also had the advantage of a background of many years in Store Operations, before being promoted to his position in head office.

The question that remains is whether this approach and the associated lack of conflict would continue with the new DP developments. The Information Systems Controller identified the issue of staffing as 'contentious' and one which he 'lost'. Other points which gave rise to some discussion were the authorisation procedure and time scales. The Information Systems Controller wanted to introduce systems quickly (as he did at Laws) whilst others were holding him back. These developments, however, were still at an early stage, ie the choice of technology. The design of systems, implementation and initial operation would come later. The contrast between the emergent strategy at Laws (which, as illustrated in Chapter 8, was largely influenced by the DP Manager) and that of previous developments in Wm Low, would suggest that conflict may arise later over the differing

approaches. Different opinions may exist about such things as the degree of user involvement, the speed at which developments should take place, the purchase of packages, or in-house development.

Other important questions regarding the future DP developments include: Would the increase in the size of the department lead to resentment? Would the DP Department assume a more dominant role and 'impose' the systems on the rest of the company? These are largely issues of power and politics which will be dealt with in the next section.

Power and Politics. In contrast to Laws Stores, the incumbent DP Manager in Wm Low did not appear to possess a great deal of power. This view was derived from the evidence of previous developments and interviews with respondents. For example, when referring to the choice of laser scanning equipment the Senior Methods Manager noted that, 'if I was the DP Manager I wouldn't have let me make that decision'. The DP Manager was generally considered competent at his job but, because of his age (late 50s) and 'mild-mannered' nature, it was felt that he would be unable to cope with the rapid developments that were taking place in retail technology, and therefore this would limit the DP Department's progress. Consequently, the Information Systems Controller was appointed as his superior. This would seem to lend further support to Pettigrew's (1973) observation that access to sources of power are not sufficient without the skills to utilise them.

In his new position would the Information Systems Controller be able to exercise the power he had demonstrated in Laws? As most of his proposals were accepted by the board, the evidence initially available would seem to suggest that this was the case. Those issues which provoked discussion (staffing, authorisation, timing) were 'non-technical' matters. Thus indicating that where the issues were more technical, the Information Systems Controller 'won' because of his greater specialist knowledge. However, this was only the first stage in the introduction of new technology, during which he may have been experiencing something of a 'honeymoon' period.

The other stages of the development were outside the scope of this research. Nevertheless, based on available evidence (for example the progress of developments in Laws, a comparison of the two companies and the previous behaviour of the Information Systems Controller), it is possible to speculate on what may happen. As shown above, the approach by the Information Systems Controller to the introduction of new technology was incompatible with that previously employed in Wm Low. In future stages conflict may arise over a number of issues as the strategy emerges. Four significant factors would be likely to influence the outcome of that conflict.

(a) It was shown in the Laws Stores case study that as time passes other individuals gain experience and knowledge of computerisation and begin to question the decisions of the specialists.

(b) The structure of the company and processes in operation required the involvement and co-operation of other departments.
(c) The location of the Information Systems Controller in the management hierarchy was less powerful than that of other members, in particular the Productivity and Distribution Controller, who sat on the Management Committee and reported direct to the Managing Director.
(d) The leadership style of the Managing Director was different and more autocratic than that of the Chairman at Laws Stores.

Therefore, it is possible to speculate that the Information Systems Controller would be unable to exercise the same degree of power as he did at Laws Stores and would have less influence over the emerging new technology strategy. This is further supported by the fact that less than a year after the new technology proposals were agreed by the board, the Information Systems Controller resigned to take up a new position elsewhere.

SUMMARY

Historically, there were many parallels between Laws Stores and Wm Low. In terms of technology, the only similarity was that in neither case was the strategy formulated and articulated in advance. However, the factors influencing the emerging strategy, and therefore the outcome, were significantly different. In Wm Low, the structure of the organization was more flexible and adaptable. There was a greater degree of communication,

facilitated largely by the Management Committee which acted as a forum for discussion on all aspects of the business, including new technology. Innovation came from a variety of sources, but not from the DP Department, which played a less dominant role than in Laws Stores. Strong control was exercised by the Managing Director.

Consequently, technological developments in Wm Low, which had begun almost twenty years prior to those in Laws Stores, had progressed slowly and cautiously. They had been designed with the full co-operation and commitment of the user departments. They were less subject to political manoeuvering and the influence of powerful individuals. As a result, the systems were more efficient and created less conflict. It is concluded that, following the resignation of the Information Systems Controller, the latest developments announced in September 1985 would probably progress in the same manner as those of the last twenty years.

12. CONCLUSIONS

This chapter has four aims. First, it aims to summarise the findings of previous research on new technology and in particular new technology in retailing. Second, it aims to analyse the findings of the thesis and its relationship to previous works. The third aim is to extend the findings of this research and show its applicability for other retail organizations, as well as its usefulness for practising managers. Finally, this chapter reviews the major conclusions of the thesis and the implications these have for future research.

THE FINDINGS OF EARLIER RESEARCH

As noted in Chapter 6, there has been relatively little research on retail technology. What work has been done falls broadly into three categories. First, the technical reports, second the works which tend to be largely prescriptive and optimistic and third, the pessimistic studies investigating the impact of technology on the workforce. Many of these works are not based on any empirical research. Of those that are, the focus has generally been at a global level, investigating the 'before' and 'after' situation and predicting likely future trends. There has been an obvious neglect of the process of introducing and implementing new technology into a retail organization.

For previous works on the actual process of introducing new technology into a company it was necessary to review a broader range of literature, often referring to manufacturing industry. Even in this much wider field, the processual viewpoint was found lacking. Again, much of it was technical, or not at the appropriate level. Some studies were too generalised, for example looking at the rate of diffusion of technical change. At the other extreme were those concerned with the role of, and the effect on, the individual operator. The implications of new technology at the organizational level were less well covered. Another deficiency in the literature is that it focuses on the impact of technical change rather than the problems of managing its introduction. Those works which have looked at the actual process of introduction have tended to be prescriptive in nature and have generally not been based on original research. Those few that have investigated the process of introducing new technology have invariably looked at only one stage in this process. This is largely for practical purposes as the whole process, from the decision to introduce technology through to its routine operation usually takes several years.

As a study of organizational behaviour, the thesis also drew on works from an even wider field, in particular the work of the contingency theorists. Most relevant in this field was the work of Woodward (1965) and the subsequent debate on 'technological determinism' versus 'strategic choice'. Other works by the contingency theorists that were referred to include Lawrence and Lorsch (1967) and Burns and Stalker (1961) who researched the effect of the

environment in shaping the organization. There are two major criticisms of the contingency theorists in respect to this research. First, they deal almost exclusively with manufacturing industry. Second, each study deals with a single factor (for example technology or environment) which, it is thought, influences the structure of the organization and its success. There are no works which synthesize the different views of the contingency theorists and certainly none which relate them to a retailing context.

A major element of the thesis was the study of the of the strategy to introduce new technology. A review of the relevant literature showed there to be some confusion over the definition of strategy, in particular whether the term should refer to both ends and means, ie both the goals and the methods used to achieve them or just the means. Another area of confusion is the concept of strategy formulation. Many works view strategy as a concious plan and explicit set of guidelines developed in advance. Others see it more as an evolutionary process in which the strategy emerges as a result of decisions made over a period of time. On the whole, the studies of strategy have tended to take a rather global and long term view. There has been a neglect of the actual processes involved in the formation of the strategy and of the many factors which may in reality limit a company's ability to implement that strategy.

THE METHODOLOGICAL APPROACH

The relatively good access to a company enabled the researcher to study the process of strategy formation and discover the 'real world' problems of introducing new technology. The use of particpant observation was chosen as the most appropriate research technique in this context and one which enabled the researcher to derive greatest benefit from this potentially rich source of information. In previous studies of the introduction of new technology in retailing, the primary research techniques have been questionnaires or single interviews. Although some studies may have included a period of participant observation, these have only been for a short time and have not formed the major data source. Therefore, the use of participant observation in this research provides a new approach to the study of retail technology. It enabled valuable insights to be gained into this previously under-researched area.

As part of the research strategy, two other techniques were used: interviews and analysis of documentary evidence. Thus, by employing this method of triangulation, the inherent weaknesses of any one method were avoided and a solid empirical basis for the thesis was established. A comparative investigation into a similar organization with a different approach to new technology was then undertaken. This enabled the researcher to gather additional information and further refine the thesis.

RESEARCH FINDINGS

By using the methodological approach described above, the research provided valuable empirical evidence to support or refute ideas developed in previous works on new technology. The thesis draws together literature on strategy formation, organizational processes and the various underlying factors and relates them to the technological changes taking place in two retail companies.

Strategy Formation. The research supports the view of McLoughlin et al that the introduction of new technology can be divided into five different stages: the decision to introduce; choice and design of the technology; implementation; initial operation and routine operation. By studying the whole process, the research found that these were not logical, discrete, sequential steps, they often overlapped and the process was an iterative one. Furthermore, 'new technology' was not a single element, but was found to consist of a number of different components, both hardware and software, which were progressively introduced into the head office and stores over a period of two and a half years.

The strategy to introduce new technology was not formulated and articulated in advance, but evolved as a result of decisions made at different stages during its introduction. The strategy could therefore only be identified retrospectively. This lends support to Mintzberg's (1978) view of an 'emergent' strategy that

is: (a) not explicit; (b) not developed conciously and purposefully and (c) not made in advance of specific decisions. It is also in line with McLoughlin's findings that sub-strategies are developed at the various stages in response to prevailing circumstances. This is contrary to Chandler's (1962) view of strategy as planned courses of action to achieve the basic long-term goals of an enterprise.

The evidence presented here would seem to refute Mintzberg's advice not to make the strategy explicit which, he states, would invest it with even greater momentum. However, such momentum would have been beneficial, as members of the DP Department often complained that they were making all the progress and 'dragging the rest of the company' with them. To have made the strategy explicit would also have made it more legitimate, direction would have been seen as coming from the Chairman, rather than the Finance Director or DP Manager, as was often thought to be the case. It would have given the organization members a clearer idea of the objectives and greater confidence to achieve those objectives. Making the strategy explicit would also have provided an opportunity for others to express opinions, ask questions or raise objections. Thus ultimately, by having clear objectives and the opportunity for participation, commitment to the changes would have been increased.

As the strategy was not formulated and explicitly stated in advance, it was possible for functional managers at

each stage to influence the emerging strategy in their own interests. A further appreciation of how this took place is gained by looking at the organizational processes involved in bringing about the change.

Organizational Processes. Organizational processes were identified as being important in forming the strategy to introduce new technology into Laws Stores and the subsequent implementation of that strategy. These processes can be summarised under the headings of: power and politics; commitment; communication and conflict.

Following on from the work of Pettigrew (1973), power and politics were found to be key factors in the introduction of technology. However, unlike his study, political manoeuvring was not confined only to the Management Services Department, but existed in all areas of the company. Furthermore, it did not just take place during the initial computer purchase decision but throughout the whole introduction and implementation process.

The DP Manager was found to exercise considerable power. The sources of his power came from his specialist knowledge, his access to decision makers, his political sensitivity and his structural position. This latter aspect contradicts the work of Bacharach and Lawler (1980). In their terms, the DP Manager could be said to possess influence, but they found structural position to be a source only of authority. Nevertheless, the DP manager's influence stemmed, at least in part, from his

structural position as 'gatekeeper' through which information about the new technology was channelled.

Conflict has often been noted as a feature of technological change. However, contrary to what most of these works (and the coverage in the media) would lead us to believe, hostility and resistance to change are not an automatic reaction of the workforce. At Laws, the initial reaction to the new technology was one of passive acceptance both from the workforce and executives. The thesis highlighted the three reasons for this. First, an unwillingness to oppose the Chairman. Second, lack of experience and knowledge coupled with a perceived dependence on the computer specialists. Third, by introducing the first systems into the Finance Department, which was also under the same director as the DP Department, problems could be restricted to this one area.

Only as developments progressed and the users gained the confidence to question the specialists, did conflict arise. This conflict was largely at executive level, between the computer specialists and other staff functions. At the level of the workforce the attitude remained one of passive acceptance.

Another key process was the communication between different departments. This was an important aspect of technological change as the developments that were taking place required changes in working practices and a level of integration between the different departments which did not previously exist. Communication tended to flow

vertically, so only the Chairman and his son at the top of the organization got the total picture of what was happening. There were well defined boundaries between departments that were not easily crossed. Lateral communication was poor, sometimes leading to the withholding or distortion of information between departments.

The barriers between departments also meant that it was difficult for the computer specialists to become integrated into the rest of the company. This feature was also noted by Pettigrew (1973) and the early works of Mumford (Mumford and Ward 1966). However, in reporting her later studies, Mumford (1981) notes that the situation had changed. Computer developments were no longer the sole prerogative of the specialists. It was now recognised that the users were capable of making a useful contribution, leading to co-operation between different departments. Nevertheless, the integration of computer specialists and the users still appeared to be a problem in this research. Two major reasons for this were identified. First, the functional nature of the organization structure (an aspect which will be dealt with later). Second, as Laws had no previous experience of in-house computing this created something of a 'culture gap' between the computer specialists and other members of the organization. These differences covered attitudes, motivations and job aspirations as well as more practical problems of communication and the use of 'jargon'.

There was also a problem with commitment to the changes that were taking place at Laws. Many members thought the change was being imposed on them and, as noted earlier, their reaction was one of passive acceptance. Whilst this may have been sufficient in some circumstances, the 'user-driven' approach adopted at Laws required a greater degree of commitment, as the users were expected to take responsibility for the development of the systems. Some attempt was made to consult with the users, but this was largely superficial. When 'bugs' became apparent later, no-one felt sufficient 'ownership' of the systems or the responsibility to correct them. This was similar to Bessant and Dickson's (1982) 'marketing approach' in which there is an attempt to 'sell' the systems to the users, but the initial favourable response turns to disillusionment later as problems with the technology emerge.

Underlying Factors. The evidence gathered from Laws Stores, supported by the comparative study at Wm Low, showed that four major factors gave rise to the above organizational processes, which subsequently influenced the emergent strategy to introduce new technology. These were identified as the decline of the organization; family ownership of the company; environmental uncertainty; and the organizational structure.

Previous works on organizational decline showed that such companies experienced increased conflict, politicking and poor integration. The implications for bringing about change included a loss of skilled staff, resistance to the

changes in order to protect vested interests and a slower response to environmental shifts. These features were particularly marked in Laws Stores because the large and growing investment in new technology represented an increasing share of a smaller cake. At Wm Low, the company was expanding, therefore the investment in new technology did not create such resentment and did not result in so much conflict and political manoeuvring.

Family ownership of the company was found to be an important factor in determining how members behaved. First, the family members themselves were unable to divorce their roles as owners from that of operating managers and thus experienced 'role ambiguity'. This contributed to the ill-defined and poorly articulated strategy which was noted earlier and led to concentration on operational decision-making. There was also a tendency to develop 'pet projects' which were not necessarily financially justified and which other members of the Board, because of their loyalty to the Chairman, were unwilling to question. Laws had difficulty in recruiting and retaining suitably qualified data processing staff because of the lack of opportunity and influence in a family-dominated firm. A further drawback was the lack of capital available for investment.

The environment in which both Laws Stores and Wm Low operated was identified as being highly dynamic and uncertain. In terms of new technology, laser scanning was not yet well established and there was still some doubt about the possible benefits. This uncertainty was

compounded by a large number of suppliers offering a variety of systems and the rapidly falling cost of the hardware. Although applicable to both companies, this uncertain environment seemed to create greater problems for Laws Stores who were unable to respond effectively to the changes that were taking place. A number of reasons for this were identified. One of which, the relative decline of the organization, and the associated resistance to change, has already been noted. Another reason, the functional nature of the organization structure, will be dealt with shortly.

A third reason was the companies' differing perceptions of the environment and their own ability to alter it. Although there was a wide variety of choice of technology the Board at Laws Stores did not perceive this. They did not systematically review all the alternative suppliers, different types of equipment and different ways in which it could be used. As their search activities were limited, they failed to recognise the wide variety of strategic choices that were available to them. Consequently, the technology was used in a deterministic manner. Furthermore, Laws perceived themselves as having little power to alter the environment and took very much of a reactive stance. This is in comparison to Wm Low, who took more of a proactive approach, particularly with regards to new technology where they dictated their requirements to the equipment suppliers.

The last, and possibly most important, factor which was found to give rise to the organizational processes was the

organization structure. There have been many studies into the relationship between technology and structure. However, most of these have concentrated on the impact of technology on structure, rather than how the existing structure could influence the process of introducing new technology, which is the focus of attention in this thesis.

The functional structure at Laws was found to be a major cause of the poor lateral relations. It restricted interactions between departments, creating conflict and leading to the internalisation of sub-goals. This reduced the company's ability to adapt to the new technology. The investigations in Wm Low further supported this view. They adopted a more flexible, organic type of structure and used committees for consultation and decision-making. This led to improved lateral relations and better adaptation to the new technology. Burns and Stalker (1961), found that an organic structure was more appropriate to unstable conditions. Whilst their work was not specifically related to technology, it is consistent with the earlier observation that the recent developments in retail technology created an uncertain environment. Therefore, it is argued that Laws should have adopted a more organic organization structure. This would have enabled it to respond more effectively to the uncertain environment and succesfully implement the emerging new technology strategy.

It has already been noted that the concept of strategy identified in this thesis is contrary to that used by

Chandler. Furthermore, the evidence presented here also fails to support his hypothesis that structure follows strategy. The strategy to introduce new technology into Laws Stores and Wm Low was found to have only limited effect on the organization structure. Indeed, it is demonstrated that the structure plays a large part in influencing the emerging new technology strategy. Therefore, it is argued that changes in structure should precede strategy, and only in doing so will the strategy be successfully implemented.

APPLICABILITY OF FINDINGS TO OTHER ORGANIZATIONS

The type of intensive approach employed in this research provides a rich source of empirical evidence, but is extremely time consuming. Thus, it is only possible to investigate a small number of case studies in this way. Therefore, the possiblilty of generalising the findings to the wider population, in this case the retail industry as a whole, is limited. However, the benefit of the deep insight gained more than outweighs the restrictions on generalisation. Based on a knowledge of the retail trades, other works in this field and a process of logical deduction, the findings of this research can be applied to other retail companies which display some of the characteristics identified at Laws Stores.

First, there are many medium-sized companies facing an uncertain environment and pressure from the larger multiples. In the supermarket trade in particular, a large gap exists between the small regional chains and the

national multiples. This gap is not only in terms of the number of stores, turnover and profits, but also management techniques, structure and attitudes. Second, some retail companies are still family firms, ie owned and managed by descendents of the founder. In view of the many takeovers that have taken place in the early 1980s, many are struggling to maintain their independence. This thesis may give some clues as to why independent retailers are something of a 'dying breed' and, in cases where it is not already too late, offer at least partial solutions to enable them to survive.

Third, for historical reasons many of these companies have developed a functional structure. This is largely due to the organic growth of the firm which, after establishing a number of units, centralises control and decision-making. Then, for reasons of efficiency, the organization is divided into separate functions responsible for Buying, Accounts and Store Operations. Unless these companies also employ some integrative mechanisms, as Wm Low did, they may experience some of the problems with lateral relations, such as poor communication and co-ordination, that were observed at Laws.

Fourth, the lack of strategic planning that was highlighted in this thesis has also been noted elsewhere as a common characteristic of retail companies. According to Knee and Walters (1985), retailers exhibit something of a 'butterfly spirit', flitting from one operational problem to another without concern for the long-term implications. Davies et al (1985) also note that only the

top three or four grocery retailers use any form of strategic planning. Evidence on the diffusion of new technology in retailing would suggest that many of these smaller retail chains are now beginning to introduce EPOS. From January 1982 to December 1984 the number of scanning stores increased four-fold (Euromonitor 1985). Furthermore, if the predictions are correct many more companies are contemplating EPOS. A survey undertaken by Post-News found retailers anticipated that 73% of their checkouts would be fitted with laser scanners by 1990 (Brown 1986).

The findings of the thesis, therefore, have significance for retailers who are currently introducing new technology, or who intend to in the future. Undoubtedly, at least some of these companies will encounter the problems described here. Whilst the thesis does not provide all the answers (indeed it may not even identify all the problems) it does provide a situation which it is hoped other companies will be able to identify with. In doing so it offers a framework which will enable them to trace the causes of the problems within their own organizations and enable them to take appropriate action. In particular, this research should encourage them to look beyond the technical, economic and financial aspects of new technolgy to the underlying factors which may be constraining their ability to fully realise all the benefits.

Many of the above factors also provide the justification for studying retailing as a special case, rather than

generalising from the evidence of manufacturing organizations. This includes the predominance of family firms and functional structures in retailing as well as the neglect of strategic planning. Most importantly the rapid technological changes that are taking place, the widespread nature of these changes and their far-reaching implications make it a particularly worthwhile area of study. However, although it is possible to make deductions about the possible differences between manufacturing and retailing, it is not until significantly more research has been done in the latter area that more meaningful comparisons can be made.

MAJOR CONCLUSIONS AND IMPLICATIONS

The major contribution of the thesis stems from the nature of the research and the methodological approach adopted. This enabled the author to study the whole process of introducing new technology from the perspective of the total organization. Only in this way was it possible to identify the complex interaction of factors influencing technological change. The thesis demonstrates how four major factors gave rise to the processes which subsequently influenced the emerging new technology strategy.

One of the major outcomes of this work has been the emphasis which it gives to the interplay between structure, technology and process which it is important for companies to understand if change is to be successfully implemented. The thesis also draws attention

to the importance of utilising the freedom of choice that is available. The conclusion here is that where existing organization structures do not enable companies to exercise this choice, then their chances of successfully introducing new technology are considerably reduced. In the light of this evidence, the major conclusion of this work would appear to be that structural change, combined with a clear understanding of the process issues involved, needs to precede rather than follow as a result of technological change.

Implications for Future Research. New technology in retailing is still a relatively under-researched area. However, as developments are now progressing more rapidly, the possibilities are also becoming greater. More companies are beginning to introduce EPOS, thus providing scope for more in-depth research, such as that reported here. In addition, it will also provide the opportunity to test some of the findings of this research by undertaking a survey of a number of different retailers in different situations.

In addition to EPOS, there are other technological advances taking place which provide opportunities for further research. One such development is the Tradacoms standards laid down by the Article Number Association (ANA) to enable retailers and suppliers to exchange data using a common format. Linked to this is Tradanet, a bureau designed to sort the data and deliver it to the correct recipient. Probably the most widely publicised development is Electronic Funds Transfer at the Point of

Sale (EFTPOS). This will enable the retailer to debit the customer's bank account instantly, upon production of the appropriate card at the checkout. Such developments provide a wide range of issues for research, including the relationship between retailers and other organizations such as suppliers and banks.

What implications do the findings reported here have for future retail technology developments? The thesis has demonstrated the difficulties that retailers encounter when introducing new technology within their own organizations. It is likely that these will be even more acute as it becomes necessary to liaise with outside organizations. Therefore, just as the diffusion of EPOS has been much slower than predicted, so these more recent innovations will progress more slowly than anticipated. The constraining factors are not, as is often claimed, the hardware or software. The underlying reasons are much more complex and rest within the organizations themselves. Until further attention is devoted to the organizational aspects of introducing new technology into retailing (both on the part of researchers and the companies themselves) the rapid developments that are predicted will not take place and the potential benefits will not be fully realised.

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GLOSSARY

ADS	Anker Data Systems: Supplier of EPOS equipment.
ANA	Article Number Association: The UK organization responsible for controlling and co-ordinating the introduction and use of a unified system of numbering for all manufactured or processed products (the Article Numbering System).
Barcode	The article number converted into a machine-readable form. The barcode consists of a series of bars and spaces of varying width. When read by a light pen or laser, the barcode is translated back to its original number.
BMS	Building Management System: A computer-based system used for monitoring and controlling the energy requirements of a store.
CASS	Collaborative Award in the Social Sciences.
CIS	Computer Information System.
DIDOS	Direct Invoice Delivery Order System: Method by which invoices and delivery notes are matched for goods delivered direct to branches.
DTS	Data Terminal Systems: Supplier of EPOS systems.
EAN	European Article Number: International system for controlling article numbers.
EFTPOS	Electronic Funds Transfer at Point Of Sale: Payment for goods by automatically transferring funds form the customer's bank account to the retailers.

EPOS	Electronic Point Of Sale: A general name for systems which record sales data at the point of payment onto cassette tape or computer file.
ESRC	Economic and Social Research Council.
IBM	International Business Machines: Supplier of computers and EPOS systems.
ICL	International Computers Limited: Supplier of computers and EPOS systems.
IMPROVE	Inventory Management Product Replenishment and Order Validity Evaluation.
Laser Scanning	A type of EPOS system usually found in supermarkets. Comprises a flat-bed device or light pen with a low-powered laser to read barcodes.
MSI	MSI Data International: Supplier of PDC units.
NCR	National Cash Registers: Supplier of EPOS systems.
NISA	National Independent Supermarkets Association: Organization representing 352 independent retailers with the main aim of increasing buying power.
OPD	One Per Desk: An ICL personal computer with telephone attached.
PDC	Portable Data Capture (Unit): Hand-held device capable of recording data at the point of origin and transmitting it, via telecommunications links, to a central point. Also called Portable Data Entry Terminals (PDET).

PLU	Price Look Up: System whereby the price of a product is held on computer file. By entering the product code at the checkout the file is automatically accessed and the price transmitted back to the checkout.
SLIM	Stock Labour Inventory Management: System used in conjunction with PDCs for the order and replenishment of goods in-store.
UPC	Universal Product Code: United States equivalent of article numbering.
USDAW	Union of Shop Distributive and Allied Workers: Main union representing the retail trade.
Velocity Code	Short code assigned to the fastest moving items in a store, used in conjunction with PLU systems.

APPENDIX A

DIARY OF VISITS TO LAWS STORES: OCTOBER 1983 - MAY 1985

DATE	CONTACT AND PURPOSE OF VISIT
October 1983	
19th	Personnel Manager: Introductory visit.
25th	Personnel Manager: Store visits.
26th	Branch Management and Staff: Visit to Shields Road branch for explanation of company procedures for the reception of goods at the backdoor.
31st	Branch Management and Staff: Visit to Shields Road branch for explanation of company procedures for checkout operation, reconciliation of cash, banking procedures, etc. Observation of cashiers' meeting.
November 1983	
8th	Training Officer, Branch Management and Staff: Visit to stores for explanation and demonstration of problems associated with cashier operations and store administration.

9th Warehouse Managerand Staff: Explanation and demonstration of warehouse systems focusing on problems of stock-taking and stock results.

11th Training Officer and Branch Staff: Visit to Shields Road branch for explanation of store administration including invoices, wages and branch statements.

15th Head Office Administration Staff: Explanation and demonstration of administration procedures for dealing with deliveries from the warehouse and direct deliveries from suppliers.

16th Chief Accountant and Accounts Staff: Explanation of accounting systems including purchase ledger; branch stock ledger; delivery note and invoicing matching/mis-matching.

22nd Training Officer and Branch Manager: Visit to Forest Hall branch for demonstration of Portable Data Capture (PDC) unit and test transmission.

23rd Chief Accountant and Accounts Staff: Follow up visit to Accounts Office and Post Room.

29th Wages Supervisor: Explanation of payroll system. Discussion of problems encountered when system was first computerised.

30th Area Manager and Branch Manager: Visit to store to understand the operation of the various departments, eg Provisions, Produce, Meat. Explanation of ordering systems, replenishment, merchandising etc. Discussion of Price Look Up (PLU) tills with Area Manager.

December 1983

2nd Buying Director and Buyers: Introduction to Buying Department and overview of systems and procedures.

6th Company Secretary and Secretaries: Explanation of administration procedures by Company Secretary. Demonstration of word processing system by secretary.

7th Branch Manager: Visit to Whickham branch to question the Manager on the introduction of PLU tills into his store.

12th Buyers: Explanation and demonstration of buying systems. Discussion of problems and advantages.

14th Data Processing (DP) Manager: Explanation of the background to introducing in-house data processing facilities. Detailed description, in chronological order, of the way in which all head office and store systems were

introduced, the principles behind them and the problems encountered. General discussion of the management of change.

February 1984

23rd D.P. Manager: Discussion of the preparation for laser scanning in Whickham branch.

24th Personnel Director: Visit to two stores to observe the operation of in-store bakeries which had recently been introduced.

March 1984

22nd Area Manager and Branch Manager: Visit to Whickham branch to observe preparations for the introduction of laser scanning. Discussion of the difficulties encountered, in particular the problems with barcodes.

26th Branch Manager: Visit to Whickham branch to observe laser scanning on its first day of 'live' operation.

27th Chief Cashier and Checkout Operators: Visit to Whickham branch for further observations of laser scanning. Discussions with Chief Cashier and Checkout Operators on the advantages and disadvantages compared to conventional checkouts.

April 1984

4th Personnel Director: Discussion of some of the issues which had recently arisen relating to the introduction of PDC's and laser scanning.

5th Training Officer and Branch Manager: Visit to Whickham branch to investigate if the original 'teething troubles' with laser scanning had been overcome. Discussion with Training Officer on the way in which new technology had been introduced.

6th Personnel Director and Training Officer: Visit to head office for attendance at board meeting as previously arranged. Unfortunately, this was not agreed by all the board members. However, whilst waiting, an incident occurred concerning PDC's which it was possible to observe.

11th Training Officer and Senior Analyst Programmer: Observation of a meeting between the Training Officer and the Senior Analyst Programmer. This covered some of the current problems with new technology and arrangements for future PDC transmissions.

12th Buyer: Interviewed one of the buyers to investigate his department's role in the introduction of new technology.

13th D.P. Manager: Explanation of the current state of laser scanning and PDC's and recent developments within the DP Department.

Senior Analyst Programmer: Discussion of his own involvement in new developments and explanation of recent problems with PDC's.

16th D.P. Manager: Visit to Morpeth branch to investigate plans for second laser scanning installation. Observation of meeting between DP Manager, Area Manager, Branch Manager and representatives from NCR covering the preparations necessary and the timings involved.

17th Training Officer and Branch Manageress: Visited Jarrow branch to observe their first 'live' transmission with the PDC. Discussion with the Branch Manageress concerning the benefits and drawbacks of the new system.

18th Computer Operations Manager: Investigated his involvement in new developments, the nature of some of the problems that had arisen and how they had been resolved.

26th Computer Operations Manager and Staff: Time spent in Computer Room observing PDC transmissions. Explanation and demonstration of procedures involved by Computer Operations

staff. Discussion with Computer Operations Manager covering the problems and benefits of PDC's and the reactions of branch managers.

Buyer: Discussion with a Buyer on the changes to be made to the buying and warehousing system.

27th Computer Operations Staff: Further discussion of PDC transmission.

Personnel Director: Discussion on the evaluation of laser scanning to be completed by July. Comparison of checkout speeds of laser scanning tills compared with those of PLU tills.

Deputy Branch Manager: Visit to Whickham branch for their views on the comparison of laser scanning, PLU and conventional checkouts. Further observations of laser scanner in operation.

May 1984

2nd Branch Manager: Visit to Whickham branch to discuss the present state of the scanning trial. Observation and interviewing of checkout operators. Discussion with ADS representative on the operation of the laser scanning system.

3rd Area Manager: Visit to Benwell store to interview Area Manager. Investigated his views on the productivity of scanning checkouts and the benefits of PDC's.

Deputy Branch Manager: Visit to Shields Road to investigate the performance of their PLU tills compared to laser scanning.

D.P. Manager: Discussion of his views on the comparison of checkouts speeds. Observation of a meeting between the D.P. Manager, Personnel Director and Operations Director. Followed by observation of a further meeting between the D.P. Manager and Personnel Director.

4th Personnel Director: Visit to Whickham and Rowlands Gill branches to assist in timing of checkout operators.

9th Personnel Director and DP Manager: Observation of a meeting between the Personnel Director and D.P. Manager for further discussion of checkout timings.

10th Branch Manager and Deputy Manager: Visit to Morpeth branch and Blaydon branch to investigate information available from NCR tills without laser scanning.

14th Personnel Director and DP Manager: Visit to Morpeth Branch to observe a meeting between the Personnel Director and D.P. Manager. The meeting was called to agree a method of investigating checkout productivity before and after the installation of scanning equipment. The Branch Manager and a representative from NCR were also present.

Training Officer: Discussion of latest developments with laser scanning and PDS's.

Computer Operations Manager: Discussion of latest developments with PDC's.

15th Area Manager: Visit to Askew Road branch for an interview with Area Manager to discuss the latest developments with laser scanning and PDC's.

Attendance at a Briefing Meeting held for all head office executives. This covered the current financial state of the company, a new advertising campaign and other new developments.

June 1984

6th Personnel Director: Discussion of recent events concerning checkout productivity.
D.P. Manager: Discussion of checkout

productivity and preparations for the second laser scanning trial to be installed at Morpeth.

7th Personnel Director: Attended a presentation given by a consultancy firm to demonstrate a space management software package.

13th Deputy Manager: Visit to Morpeth Branch to observe preparations for the introduction of laser scanning.

D.P. Manager: Discussion of the problems with some barcodes.

14th Merchandise Accounting Manager: The interview covered her responsibilities, involvement in various systems and problems encountered.

Buyer: Investigation of the latest developments with the buying system.

Area Manager: Visit to Blaydon branch to interview the Area Manager who reported that problems with the system at Morpeth has now been corrected.

18th Area Manager and Branch Manager: Visit to Morpeth to observe scanning on the first day of 'live' operation. Discussions with Area Manager and Branch Manager.

20th D.P. Manager: Discussion on the current state of scanning and possible future developments.

21st Operations Director: Interview to investigate the company strategy regarding new technology, particularly laser scanning, and his own role in such developments.

Trainee Manager: Visit to Morpeth branch to observe laser scanning in operation.

July 1984

4th Personnel Director: Discussion of the latest developments with laser scanning. Also covered future hardware and software requirements for the computer and past problems.

5th Checkout Operators: Visit to Morpeth for further discussion of laser scanning and discussions with checkout operators.

9th Work Study Officer: Visit to Whickham branch with Work Study Officer for investigation of 'problem products' with barcodes that would not scan.

17th Area Manager: Visit to Benwell store to inverview Area Manager about his views on the progress of laser scanning.

Buyer: Discussion of the buying system and any possible benefits laser scanning might have for the Buying Department.

Chairman: Detailed discussion on the company in general and new technology in particular.

18th Branch Manager: Visit to Morpeth branch to interview the Branch Manager on the current state of scanning and future developments.

24th Operations Director: Discussion of the possible introduction of barcoding guns and scales. Also discussed linking the two laser scanning branches to the head office computer.

25th Branch Manager: Visit to Whickham branch to interview the Branch Manager regarding benefits and drawbacks of laser scanning.

D.P. Manager: Detailed interview on the purchase and introduction of the computer up to the present day.

August 1984

22nd D.P. Manager: Discussion of the recent computer failure. Also covered future development of PDC's.

30th Personnel Director: Discussion of the preparation of a laser scanning report to be presented to the board. Also covered recent computer failure.

Area Manager: Brief up-date on current state of scanning stores.

October 1984

3rd Personnel Director: Discussion of the further evaluation of laser scanning which he is undertaking.

5th D.P. Manager: Discussion of his report on 'Summary of Scanning at Laws Stores Ltd'.

10th Personnel Director: Interview to investigate future technological developments.

Deputy Cashier: Visit to Morpeth to investigate checkout performance and observe laser scanning.

23rd Personnel Director and Branch Manager: Visit to Jesmond branch to observe preparations for the installation of PLU checkouts.

November 1984

13th Personnel Director: Discussion of possible future technological developments.

D.P. Manager: Discussion of possible future technological developments.

20th/21st Personnel Director: Visit to Head Office to study minutes of meeting relating to new technology developments from January 1982 to December 1984 (Appendix C).

27th/28th Personnel Director: Visit to head office to study memos relating to new technology developments from January 1982 to December 1984. (Appendix B)

14th Training Officer: General discussion on company philosophy and attitudes to new technology.

19th Personnel Director: Visit to head office for Christmas lunch.

January 1985

3rd Personnel Director and Training Officer: Brief visit to head office for update on recent events and future prospects.

10th Training Officer: Informal discussions with the Training Officer and other staff about recent events.

16th Personnel Manager (Wm Low): Introduction to the Personnel Manager of Wm Low. Discussion of the research project and possibility of continuing with Wm Low. Also discussed Wm Low's approach to new technology compared to that of Laws Stores.

Training Officer and Merchandise Accounting Manager: Discussion of initial impression of Wm Low and comparison with Laws.

23rd D.P. Manager: Comparison of Laws Stores and Wm Low.

24th Operations Director: Conducted a structured interview. Topics covered included the organization structure of Laws Stores; the environment in which it operated and attitudes to new technology (Appendix H).

25th Buyer: Conducted a structured interview as above.

29th Training Officer: Announcement made by the Managing Director of Wm Low.

February 1985

7th	Produce Specialist: Comparison of Laws Stores and Wm Low.
8th	Store Manager: Visit to Whickham branch to discuss laser scanning. Further discussion comparing Laws Stores with Wm Low.
13th	D.P. Manager: Discussion on the DP Department and the computer systems.

Throughout March, April and May structured interviews were conducted with the following members and ex-members of Laws Stores. The topics covered included the organization structure of Laws, the environment in which it operated and attitudes to new technology (Appendix H).

March 1985

13th	Computer Operations Manager
14th	Chief Accountant
15th	Store Manager, Whickham
18th	Merchandise Accounting Manager
	Training Officer
21st	Marketing Assistant
25th	Area Manager
28th	D.P. Manager
	Senior Area Manager

April 1985

1st	Store Manager, Shields Road
18th	Chairman
22nd	Finance Director (resigned June 1984)

May 1985

7th	Project Leader (resigned July 1983)
8th	Personnel Director

Although the Finance Director and Project Leader had left the company some time prior to the interview, both had been involved in the introduction of new technology. It was therefore necessary to interview them in order to build a complete and balanced picture of events.

APPENDIX B

MEMORANDA

DATE	SENDER AND SUBJECT
3.5.82	Finance Director - Three Year Plan 1982-85 Inclusive
2.8.82	Personnel Director - Laws Stores - Strengths and Weaknesses.
3.8.82	Chairman - Impressions and Prospects.
3.8.82	Finance Director - Impressions of the Laws Stores Business.
20.8.82	Finance Director - Management Information Systems Review/Electronic Point of Sale Equipment.
23.9.82	DP Manager - PLU Systems.
27.9.82	DP Manager - Visit to Milan Retail Centre.
27.9.82	DP Manager - Hursley One Company Course.
14.12.82	Finance Director - Board Report on Management Information Systems (MIS).
17.1.83	Finance Director - Board Report on MIS.
8.2.83	Finance Director - MIS Report.
8.3.83	Finance Director - MIS Report.
25.3.83	Finance Director - Future DP Developments.
31.3.83	Finance Director - MIS Report.

29.4.83 Finance Director - MIS Report.

23.5.83 Finance Director - System Responsibilities.

27.5.83 Finance Director - MIS Report.

28.6.83 Finance Director - MIS Report.

22.8.83 Finance Director - MIS Report.

24.8.83 Chairman - Laser Scanning.

9.9.83 Finance Director - MIS Report.

9.9.83 Finance Director - IBM System 38 Storage Requirements.

12.9.83 Finance Director - Scanning Pilot.

14.9.83 Finance Director - MIS Report.

23.9.83 Chairman - Conversations at EPOS Exhibition.

29.9.83 DP Manager - Warehouse System.

4.10.83 Systems Analyst - IMPROVE - Daily Ordering.

10.10.83 Chairman - Review Meetings with Pairs of Executives.

14.10.83 DP Manager - DP Changes.

28.10.83 DP Manager - DP Development.

31.10.83 Chairman - Review Meetings with Pairs of Executives.

1.11.83 Company Secretary - DP Development Priorities - Branch Stock Ledger.

15.11.83 Operations Director - Budgen's Scanning.

22.3.84 Chairman - Use of IBM PC.

22.3.84 Personnel Director - Capital Expenditure.

2.4.84 DP Manager - Management Information Systems.

4.4.84 Chairman - Scanning - Exploitation and Appraisal.

19.4.84 DP Manager - Scanning Pilot at Morpeth - Timetable of Events.

24.4.84 Personnel Director - Scanning Tills.

27.4.84 DP Manager - DP Developments.

2.5.84 DP Manager - Future DP Developments.

3.5.84 DP Manager - Scanning Pilots.

4.5.84 DP Manager - Scanning Timings

24.5.84 Personnel Director - Scanning Evaluation.

25.5.84 Operations Director - Scanning Meeting.

25.5.84 DP Manager - DP Developments.

1.6.84 Operations Director - DP Priorities.

6.6.84 DP Manager - Scanning Surveys.

22.6.84 DP Manager - DP Developments.

9.8.84 Personnel Director - Scanning Evaluation.

20.8.84 DP Manager - Contingency Planning for DP Failure.

21.9.84 Chairman - Appraisal of Scanning.

23.10.84 Personnel Director - Scanning Appraisal.

8.11.84 DP Manager - DP Developments.

6.12.84 DP Manager - DP Developments.

18.12.84 DP Manager - Systems Development at Shops.

APPENDIX C

MINUTES OF MEETINGS

DATE	MEETING AND THOSE PRESENT
11.3.82	Executive Meeting - Directors.
7.4.82	Executive Meeting - Directors.
6.5.82	Executive Meeting - Directors
26.8.82	Executive Meeting Directors
26.1.83	IBM Systems Implementation - Directors, Members of DP Department, Representatives from IBM.
23.3.83	IBM Systems Implementation - Members of DP Department, Users Representatives.
6.4.83	IBM Systems Implementation - Members of DP Department, Users Representatives, Representatives from IBM.
27.4.83	IBM Systems Implementation - Members of DP Department, Users Representatives, Representatives from IBM.
5.5.83	IBM Systems Implementation - DP Manager, Representatives from IBM.
8.6.83	IBM Systems Implementation - Directors, Members of DP Department, Users Representatives, Representatives from IBM.
29.6.83	Executive Meeting - Directors.
25.8.83	Executive Meeting - Directors.

12.10.83 Executive Meeting - Members of DP Department, Representatives from IBM.

19.10.83 Meetings on Management and Staff - Directors.

6.12.83 Executive Meeting - Directors.

1.2.84 Executive Meeting - Directors.

6.4.84 Executive Meeting - Directors.

APPENDIX D

MISCELLANEOUS DOCUMENTS

DATE	TITLE/DESCRIPTION
17.10.67	Brochure to Commemorate the 'Official Opening of New Office Block and Central Packing Station'.
14.10.82	1982 Suppliers Conference. Text of Presentations made by the Chairman and Buying Director.
March 1983	A Report by OGC on the Conclusion of a Follow-up Market Research Study.
30.8.83	Report on a Visit to the USA by the Finance Director and DP Manager arranged by IBM.
Aug. 1983	Portable Data Capture Unit - Application User's Manual.
9.9.83	Photocopying Facilities (evaluation and costings).
9.1.84	Background Information to Advertising Agencies for a Presentation for New Advertising Campaign for Laws.
30.4.84	Visit to Portsea Island Co-op.
25.5.84	Document produced by Work Study Officer detailing problems with barcodes.
Sept. 1984	A Summary of Scanning at Laws Stores Ltd.
Various	Weekly Notes (communication to stores).
Various	Marketing Notes (communication to stores).

Various	Laws Gazette (company newspaper).
Unknown	Background Information to Advertising Agencies for a Presentation on a new Advertising Campaign for Laws.
Unknown	Possible Press Release: Laws Stores Limited - Development of New Supermarket Checkouts.
Unknown	Potted History of Laws Stores.

APPENDIX E

SAMPLE INTERVIEW - UNSTRUCTURED

BRANCH MANAGER - 13 JULY 1984

Q. In retrospect how do you view the preparation and implementation of laser scanning?

A. The preparation was not as good as it could have been and the company systems were to blame for this. If the price changes had come through earlier we would not have had as much work to do on Sunday. As we're the first to do this we had no-one else's experience to go on. We couldn't anticipate how long it would take and the price changes took a lot longer than we expected. If we'd had more money it would have been easier, but we had to do it with normal wage constraints and everything else.

Q. Were you adequately consulted?

A. Yes, certainly - everything that the Area Manager or D.P. Manager knew they passed on to me. But they were very much in the dark too because it's not the same system as the other store.

Q. Do you anticipate any further difficulties?

A. No, I think we've got everying ironed out.

Q. Are you developing any new systems?

A. If it was my decision, I would use the 'dot sytems' differently. The majority of grocery items are barcoded but we are still putting green dots on the shelf-edge labels. In reality all the barcoded items which scan O.K. could be left without dots. This would save time and money.

Q. Do you have any method of identifying problem barcodes?

A. The girls on the checkouts have a pencil and paper handy to make a note of anything not in the file or which repeatedly fails to scan and then they come and see me with the list. For example, we didn't expect Baxters to change their barcode for no reason and without prior notice. Also, barcodes change for customer offers and flash packs and these may not be in the file.

Q. Have the staff accepted the changes?

A. Yes, the checkout operation is now more sophisticated, they have to know the different departments, be able to scan, weigh produce on the scales, use the numeric pad and know the different fruit and vegetable lines. Previously it would only take a girl a couple of hours to be proficient in till operation, now it takes much longer and this has been seen with a Saturday girl who started since the introduction of scanning. This is not something which can be taught but can only be done through experience which is best gained when the shop is

quiet. Scanning does not make bad operators into good ones, or good ones into bad ones. In some cases it has made good operators better. One advantage is that it eliminates having to look for a price because the ticket has fallen off, which used to be a problem, particularly on frozen foods.

Q. Have the customers accepted the changes?

A. Yes, very well. The new system makes it easier to check off their receipt and this has been appreciated by some customers. Acceptance has been helped by gradual implementation of the changes, and this has also helped the checkout girls.

Q. How do you view the quality of shelf-edge labelling?

A. Its very poor, it peels off at the top right hand corner and dries up like a slice of cooked meat. They get very dirty and often have to be placed over the rivets. A plastic label is needed, although something is being done about this now it should have been thought out before.

Ordering new labels is a large job because the six digit code has to be written on the order form for each label. So it's easier to order a whole new batch. We have ordered three new sets so far and put about half the tickets on. The cost of plastic tickets, if they cost three times as much they would have already paid for themselves as we've replaced them three times.

Q. How much time is saved in no longer having to price the goods?

A. Time is now saved throughout the whole pricing operation. This is not just time saved in pricing a case of goods, but also looking for guns, changing ticket rolls, finding the price book, etc. A measure of this is that takings have increased by £5,000 because of the usual summer peak, but I have not had to take on any more staff as I usually would, the increased work load has just been absorbed. Whereas before one girl could do two sections, she probably now does four sections. The price books are no longer used, therefore they can easily be found and there are no missing pages.

Q. How long does it take to do price changes?

A. Price changes are probably quicker now. For increases, the ticketing is done first, and for decreases, the price in the memory is changed first.

Q. Has the speed of throughput at the checkout canged at all?

A. I don't know because all my till results are sent to the DP Manager at the end of the week.

Q. Has checkout security improved?

A We'll have to wait for the stock results before I can answer that. I have believed for a long time that the amount of money lost through wrong keying in is greater than the allowance given. Very often the girls think they know a price and don't look, when,

in fact, the price may have changed. So I do believe the stock results will have improved. However, we have also dismissed a dishonest twilight shift supervisor, so that could account for some improvement in stock results which I expect.

In addition, previously when the price of an item increased I had to declare the number of cases in the backshop, on which I would be charged the increased rate. Now, however, we still only declare backshop stock, although the goods on the shelves are also being bought by the customer at the increased price. This should also effect stock results favourably.

Q. Have there been any general improvements in discipline?

A. Yes, there is more discipline because the label tells you what goes on the shelf and the spacing of the labels tells you how many facings their should be. It is also easier to fill the shelves, anyone can do it.

Q. Is the data obtained of any use?

A. Not really because it comes out in the form of a till receipt and in a random order. The algorithm used to determine the order is very complicated. The memory required to be able to produce it in a usable order is too expensive for this machine. For larger shops you can attach a 'grand master' which will support a printer. The present system will only support a maximum of eight satellites. Another difficulty is

that the machine cannot be reset (for example, to record the number of items sold that week) without printing all of the current memory. Maybe this could be done if I asked the engineers.

Q. How do you view the introduction of barcoding guns and scales?

A. Scales are going to be introduced soon and I'm pleased about that. The checking-out of provisions is very time consuming as two hands are required to open the bag out. Guns would only be of benefit if all the information was used to give a complete picture. The barcoding guns are ten times more expensive than normal guns and do not give any direct benefit.

Q. Do you think a computer link to head office would be beneficial?

A. A link to head office would be worthwhile as a pilot test. Things have to be piloted to try them out and we might as well get ahead now that we've got scanning here. It would also be of advantage in doing price changes as the system the company has now makes it a 'rush job'. If we knew in advance we could apply a 'batch number' to initiate price changes at a later date. The buyers must know the price in advance but they always do the changes on Friday. The buying department is always being criticised, for example, we can have up to a hundred out of stocks in any one week and they may take two weeks to come in. We have to apply orange dots to

the shelf-edge labels so that when they do come in they are brought into the office for price changing in the file memory.

Q. Should laser scanning be extended to other branches?

A. Yes, I believe so. The cost can be justified, for example, as I've avoided bringing extra staff in over the summer, my wage costs are now a lower precentage in relation to sales. Its particularly beneficial where a twilight shift is in operation. This is already the most economical way of filling the shelves but could be improved still further by not having to price the goods and the associated cost benefits.

Q. Is there anything you would like to comment on that we haven't covered?

A. One or two customer reactions have been unexpected, for example new customers don't realise we have scanning, they think that because the goods are not priced the girls have to remember the prices and therefore don't trust this method.

SAMPLE INTERVIEW - STRUCTURED

The following interview was undertaken with a senior member of Laws Stores management on 14th March 1985. In order to preserve confidentiality some answers have been left blank.

****

INTERVIEW SCHEDULE - LAWS STORES

Interviewer: The aim of the interview is to investigate how the people who worked for Laws Stores perceived the company. However, before doing so I have a few preliminary questions.

1. Firstly, how long have you been with the company?

A. Three years.

2. Which department do you work in?

A.

3. What is your job title?

A.

4. Have you worked in any other departments in the company?

A. No.

SHOW CARD 1 (diagrammatic)

1. Which of these 4 types of organization most closely fits your view of Laws Stores.

A. The company was mostly like type B.
Instructions flowed down, but information didn't flow back up, and we never really got comprehensive instructions. There wasn't much co-ordination between departments, any disagreements we had went up to director level, along and then back down again. It should have worked more like an organic type of company, with the task determining what resources were required and what the priorities were. But in our case the resources and priorities were given and we had to make the best of them.

SHOW CARD 2

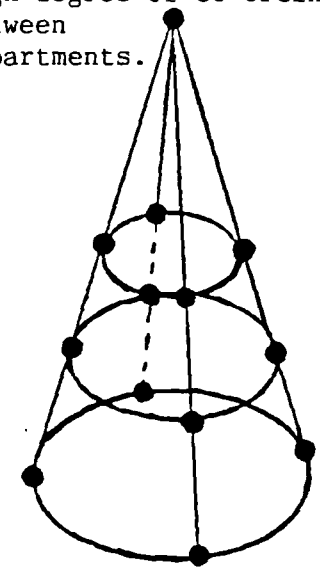
2. Which of these 4 categories most closely describes Laws?

A. Laws most closely resembled type 4, but not in all cases. For example, with the computer they were innovative, but in ther areas they were just not competing, such as bakeries and fruit and vegetables, they just followed the trend. With computers they were trying to improve performance, for example ordering, to give the customer what she required. They were trying to make the logistics more effective rather than trying to improve the product. They could have diversified product lines, in the case of

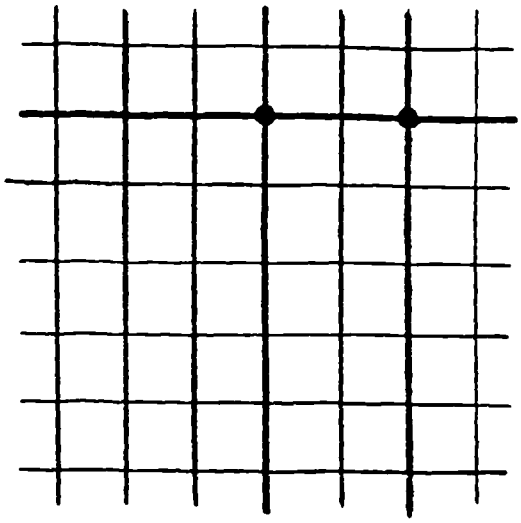
CARD I

High Integration

Type A: Instructions flow from the top downwards. Fairly high degree of co-ordination between departments.



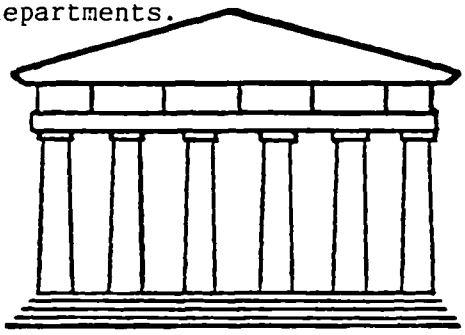
Type C: All employees take part in decision making with a fairly high degree of commitment to the company.



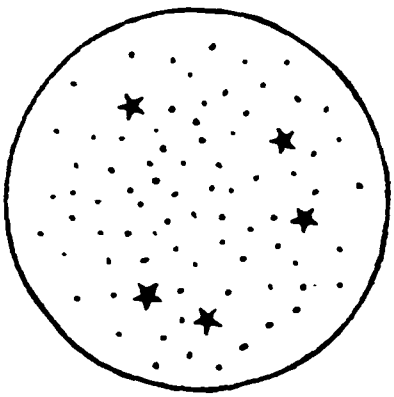
High Control

Low Control

Type B: Instructions flow from the top downwards. Relatively little co-ordination between departments.



Type D: All employees take part in decision making. Little co-operation between departments. Low commitment to the company.



Low Integration

CARD 2

TYPE 1. This type of company has a narrow and specialised market. Top managers are highly expert in this area of operation but do not search elsewhere for new opportunities. As a result of its narrow focus, this type of company seldom needs to make any major changes in its technology, structure or methods of operation. Instead, it devotes most attention to improving the efficiency of its operation.

TYPE 2. This company almost continually searches for new market opportunites and regularly experiments with new ideas. Thus, this type of company is often the creator of change to which its competitors must respond. However, because of its strong concern for product and market innovation it is unlikely to be completely efficient.

TYPE 3. This type of company operates in two types of market, one relatively stable the other changing. In the stable market it operates routinely and efficiently through the use of formal rules and procedures. In the more changeable area, top managers watch their competitors closely for new ideas, and then rapidly adopt those which appear most promising.

TYPE 4. This company is one in which managers frequently see change occurring in their area but are unable to respond effectively. Because this company lacks a consistent strategy, it seldom makes changes of any sort until forced to do so by outside pressures.

wines and spirits, they were only forced into it in recent years because of market pressures, but otherwise they wouldn't have done it.

COMMUNICATIONS NETWORK

1. Can you tell me which people - both inside and outside the company - you deal frequently with in your work, say once a week?

A. I deal most frequently with accounts staff and supervisors such as the wages supervisor. I also deal with the Finance and Administration Director and other members of the Board quite a lot.

2. Is this mainly verbal or written communication?

A. It is mainly verbal communication, especially with the accounts staff. There is some written communication with Directors and the Board as a whole, such as memos on capital expenditure and monthly reports for Board Meetings.

CONTROL OF THE ORGANIZATION

Interviewer : I would now like to investigate how decisions were taken within the company.

1. Can you tell me who was involved in decisions about wage negotiations?

A. USDAW influenced the wage rates for staff. In our case, middle management had a say in wage rates for

the Finance Department, but only because the Director was willing to discuss it with us.

2. Who was involved in decisions about recruitment and promotion of a senior member of staff, say a Branch Manager or equivalent?

A. The influence Directors had on recruitment and staff promotions varied depending on the director and the vacancy. Middle management didn't have much room for manoeuvre, they had some say in promotion within their own department, but they had no say in recruitment generally as it was politically not on.

3. Who was involved in decisions about the setting of budgets?

A. These were controlled mainly by the Chairman and Operations Director, with the other Directors having some say. Middle management, such as the Area Managers, had very little influence.

4. Who was involved in decisions about capital expenditure?

A. Again, this was decided by the Chairman and Operations Director. I don't know how much influence the other Directors had because I don't know how many unsuccessful proposals they made. A few people lower down had some influence, such as the D.P. Manager and Property Services Manager.

5. Who was involved in decisions about pricing policy?

A. The Chairman had considerable influence over the pricing structure, the Marketing Director also had quite a lot, but the others had very little. The Buyers obviously had some input because it affected the budgets they had to work to.

6. Who was involved in the choice of outside consultants, such as the advertising agency?

A. It was really down to the Chairman to choose the advertising agency. The Marketing Director had some influence as he took the Chairman along to the agency and was able to contribute to the discussions.

7. Who was involved in decisions about computer software packages?

A. The Finance Director had most say in the purchase of software packages. That's the way it should be, the specialist should know the right one and make the decisions and then it should be either rubber stamped or vetoed by the others. Middle management initially had no say, but towards the end as we had more of an overview and as packages became more integrated, we would have expected to be consulted.

8. Who decided on the priorities for computerisation?

A. The Finance Director mainly decided priorities and the Chairman would mostly go along with this. Priorites could be changed if you could take the trouble to over-turn them. Myself and the D.P.

Manager were the only ones who were really interested.

9. Who was involved in decisions about branch trading, stock levels, dispensations, etc?

A. The Operations Director would probably have most say in this area, although suggestions might come from other Directors. The Area Managers also had some influence.

10. Who was involved in merchandising and display decisions?

A. The Chairman and Operations Director had influence over merchandising to an inordinate degree. They shouldn't have got bogged down in such detail but should have worked on more strategic issues. The Buyers and Area Managers would also have some say in merchandising.

ORGANIZATIONAL ANALYSIS

Interviewer : I now wish to look at the organization in terms of its structure and its relationship with the outside world.

1. How strong would you say the competition in the area was?

A. Competition is very strong in this area.

2. How susceptible was the company to changes in competitor activity?

A. The company was very susceptible to such things as new store openings, price changes, etc.

3. What was the rate of staff turnover like compared to other supermarket chains?

A. Its difficult to say what the rate of staff turnover was like. it was probably less than major chains because the staff were happier. The large proportion of part-time staff has pushed up the turnover rate because such staff tend to be less reliable. The money they earn isn't very much and therefore it dosen't matter that much to them if they leave.

4. To what extent did the company observe the outside environment for any changes that might be taking place?

A. The company didn't observe the outside enough, this is my particular 'hobby-horse'. They didn't try to get any information, except for the most obvious statistics, on a week by week basis and thereby wrestle market share from competitors. They just didn't take enough of a global view.

5. To what extent did it imitate competitor's activity?

A. Imitation of other stores was less than average. We may have dropped our prices, but not always. We often did promotions at the same time as others.

6. To what extent did the company adopt original ideas?

A. We adopted some original ideas, such as computerisation - it has to do with the Chairman being an academic. As it was technical, it was more

up his street rather than anything concerned with the market place. The trouble is that the ancillary areas were pursued rather than the core of the business. For example, the advertising strategy was new, with the idea of the three stages and different promotions slotted in and also getting the manufacturers involved in paying for it. However, most things were not new.

7. How would you rate the planning process for new projects?

A. Unfortunately, planning was not all it should have been. It was not at the level of detail required, it did not concentrate on strategic decisions but became bogged down in detail. Things should have been reported to directors on an exception basis, with an operating board or management committee to take all the day to day decisions. Instead, what used to happen was the Board would spend all day every Tuesday in meetings, they took all day to discuss operating problems and would spend half an hour at 5pm to discuss strategy.

8. To what extent did the company evaluate projects after their introduction?

A. They would evaluate projects on an operational or technical basis, but would evaluate effectiveness, for example throughput, to a lot lesser degree. Unfortunately, the culprits were never brought to bear. The situation was one of the tail wagging the dog, by that I mean computerisation was pushing the

company rather than the company defining what it wanted from computerisation. There was always more intention to evaluate trading projects but they were never scientific and no-one was willing to learn from experience.

9. How much communication was there in the company between people at the opposite ends of the hierarchy?

A. That depends whether you mean 'conversation' or 'communication'. The Chairman was the patriarch, so conversation was just a good PR job, but there was no real communication, very little feedback. Some people who'd been here a long time would provide him with some feedback, but it wasn't structured. We should have had regular meetings for people to provide feedback. Unfortunately, the Chairman and directors didn't listen to the shop floor, communication was all formal.

10. How much communication was there between departments?

A. There was very little communication between departments, far too little, and even less co-operation (excluding the D.P. Department). There was a great deal of departmental friction with traditional lines of demarcation. Operations were very distant from Marketing, and Accounts was the 'leper in the corner' trying to catch people out. However recently, departmental barriers were being broken down, mainly because of computerisation which reaches across disciplines. For example, we had project meetings for all those involved in a

particular project. People were becoming aware and more tolerant. They now had a common hate - the computer!

With the branches it was 'us and them' - There was no two-way communication. The Operations Director felt strongly that the branches should not be bogged down in administration. It would have been better if I could have gone out and explained to Branch Managers the importances and significance of things they were doing, the forms they sent us and the printouts and things we sent them. Unfortunately, the Operations director wouldn't allow it.

OPEN QUESTIONS

1. If the outside environment was being observed at all by the company, which was the main department or individual doing this?

A. From a marketing point of view, information would be gained from trade press and from discussions with suppliers. Directors also visited some of our competitors, including Wm Low.

2. Which was generally considered the most important department within the company?

A. Marketing was generally considered the most important. They set the prices and dictated what people bought. Marketing was also blamed for Operations faults, for example they blamed their own problems on poor pricing and poor buying, so

marketing carried the can. Operations may have been thought of as more important but they weren't treated that way, no-one even bothered to visit the stores, never mind investing money in improving them. Data Processing went across all departments and the company placed great emphasis on it, although it was doing development work at the moment, eventually it would have become a maintenance function.

3. Did the introduction of new technology over the period of the last three years cause many differences of opinion?

A. The question of priorities, for development and processing time, was the most contentious. Each department had differing demands and even within departments there were differences. As I've already said, the way of resolving these would be to go up to Director level, across and back down again. The Finance Director wore two hats, Finance and Data Processing. On a number of occasions D.P. were found wanting and Finance remedied it. They thought appearances had to be kept up for the sake of morale, but I think the Chairman and his son should have been shown what was going on, warts and all. For example, the purchase ledger programme was not suitable, I don't know what criteria were used to choose it, but we were never asked our opinion. Decisions were often delivered to us as a 'fait accompli'. Some people were empire building and we just had to go along with it.

The workload was increased because of the computerisation and there was a problem of achieving deadlines. The time-scales were all wrong, the workload was too great and the timetable too short, I told the Chairman and Finance Director about it, but it didn't do any good. The only reason things got done, and at one point we were within a hair's breadth of losing it all, was because of individuals' commitment to it and desire to see that it was successful. This was just the result of personal commitment to the project and wanting it to succeed. I'm thinking here of myself and the D.P. lads. Very often it was informal relationships and alliances that got things done. The prime movers got together, agreed what needed to be done and carried it out.

4. There are some who say that Laws managed to keep going so long because of the introduction of new technology, whilst others say it was the investment in new technology which accelerated the company's decline, which view do you take?

A. In three years time the systems would have been perfect and the company working smoothly. On balance we've probably broken even on computing, it has enabled us to make better decisions, quicker. In all, it probably cost us a million pounds.

We could have gone on longer without the computer, but not stronger. We needed to generate more profit to invest in stores. Computers were the answer if you were taking a long term view, but if we were

already going down the drain they were not the solution. Finances were depleted and assets were not secured, these after all were the Chairman's insurance policy. By July the systems would have been good.

SUMMARY OF VISITS TO WM LOW, DUNDEE.

The last two visits to Wm Low were made to conduct more structured interviews (see Appendix H). This enabled comparisons to be made with Laws Stores and relevant issues, identified in previous visits, to be probed further.

Interviews were conducted with the following:

Marketing Manager

Information Systems Controller

Store Manager

Methods Manager

Managing Director

Inventory Controller

Retail Controller

Productivity and Distribution Controller

Head Grocery Buyer

Office Services Manager

Store Manager

Technical Services Manager

Personnel Manager

APPENDIX H

INTERVIEW SCHEDULE - WM LOW

The aim of the interview is to investigate how the people who work for Wm Low perceive the company. However, before doing so I have a few preliminary questions.

1. Firstly, how long have you been with the company?

   _____

2. Which department do you work in?

   _____

3. What is your job title?

   _____

4. Have you worked in any other departments in the company?

   _____

Show Card 1 (diagrammatic).

1. Which of these 4 types of organization most closely fits your view of Wm Low?

   _____

Show Card 2

2. Which of these 4 categories most closely describes Wm Low?

   _____

COMMUNICATIONS NETWORK

Can you tell me which people, both inside and outside the organization, you deal frequently with in your work, say once a week.

Is this mainly verbal, written or both?

NAME	TYPE (V, W, B)

CONTROL OF THE ORGANIZATION

I should now like to investigate how decisions are taken within the company.

1. Who is involved in decisions about wage negotiations?

Name	Comments
_____	
_____	
_____	
_____	

2. Who is involved in decisions about recruitment and promotion of a senior member of staff, say a Branch Manager or equivalent?

_____

_____

_____

_____

3. Who is involved in decisions about the setting of budgets?

_____

_____

_____

_____

4. Who is involved in decisions about capital expenditure?

_____

_____

_____

_____

5. Who is involved in decisions about pricing policy?

_____

_____

_____

_____

6. Who is involved in decisions about the choice of outside consultants, eg advertising agency, computer consultants?

_____

_____

_____

_____

7. Who is involved in decisions about computer hardware purchases?

_____

_____

_____

_____

8. Who decides what are the priorities for computerisation?

_____

_____

_____

_____

9. Who is involved in decisions about stock range, de-listing etc?

_____

_____

_____

_____

10. Who is involved in merchandising and display decisions?

_____

_____

_____

_____

ORGANIZATIONAL ANALYSIS

I now wish to look at the organization in terms of its structure and its relationship with the outside world.

1. How strong would you say competition in the area is?

2. How susceptible is the company to changes in competitors' activity?

3. What is the rate of staff turnover like compared to other supermarket chains?

4. To what extent does the company observe the outside environment for any changes which might be taking place?

5. To what extent does it imitate competitors' activity?

6. To what extent does it adopt original ideas?

7. How would you rate its planning process for new projects?

8. To what extent does it evaluate such projects after their introduction?

9. How much communication is there within the company between people at the opposite ends of the hierarchy?

10. How much communication is their between departments?

OPEN QUESTIONS

1. If the outside environment is being observed at all by the company, which is the main individual or department doing this?

2. Is there a department or area of the company which is generally considered the most important?

3. Who would you say initiates changes in the company?

4. Do you consider there to be a large degree of risk in undertaking technological change?

5. How do you view the future of the food retailing industry?

6. What part do you think new technology will play in this?

7. What new technology do you think Wm Low will introduce over the next two years?

8. Finally, what do you consider to be the strengths and weaknesses of Wm Low?

PHASE ONE: THE INTRODUCTION OF NEW TECHNOLOGY INTO LAWS STORES HEAD OFFICE AND WAREHOUSE

APPENDIX I

DATE	GENERAL	HARDWARE/ OPERATING PROGRAMMES	FINANCIAL ACCOUNTS	PURCHASE LEDGER	GENERAL LEDGER	PAYROLL	DIDOS	WAREHOUSE	PURCHASING	TEXT PROCESSING	PERSONNEL
1982 JANUARY	Computer Proposal submitted.	User Visits to IBM									
APRIL	Project Manager appointed.	Decision to purchase IBM System 38.									
MAY	Most packages identified. D.P. Manager appointed										
AUGUST	Laser Scanning Proposal agreed.	Computer and operating programmes installed.	Work in first stages. Tested and demonstrated.				Work begun.	Work begun.			
SEPTEMBER	Review of Education and Training.	3370 Disk delivered.		ifficulties encountered - IBM.	Progressing.	Shipment due but not arrived.				Urgent attention to Software - IBM.	
OCTOBER	IBM Course for Directors. VDU Training for Executives.	5225 Printer delivered.			Live data input into Computer.	Arrived.					
NOVEMBER	Visit to IBM Milan.				Sales statistics produced - Trial Balance.	Wages Report produced.					
DECEMBER	Visit to Germany.	Hardware delivered: CPU boards; VDUs; Controllers; Printer.		rograms installed.	Accounts produced entirely from Computer.	Hourly payroll - operational. Monthly payroll - testing.	Timetable agreed. Scheduled introduction - March.		Program installed. Test data installed.		Installed. Loading of data to begin.
1983 JANUARY		Latest operating software installed.		ork progressing.	Report writer developed. Budgets being input.	All 'Live' except Pensions.	Awaiting Warehouse developments.	Functional fit exercise. Agreement on Proposed System.	Work progressing. Decision required on Package.	Printer installed. Education and Training for Staff.	Test program installed.
FEBRUARY	Education proceeding.	Upgrade Processor.		ocumentation and ducation.		All programs operational.	Work progressing. Integrated with Warehouse.	File creation.	Decision made on Package.		Input progressing.
MARCH	Visit to Sweden. Critical time - last week bureau.			Live'.		Running satisfactorily.	Input testing and amendment.		Parallel run for 2 weeks.	Production of documents.	Input almost complete.
APRIL	MIS fully operational in-house. Bureau ceased.	More VDUs required.	Live Run. Branch stock ledger produced.	irst cheque run O.K.		'Bugs'.	Branch charging incorrect.	Satisfactory progress. Problems with cables.	'Live' for 2 weeks. Some problems.		Input almost complete.
MAY	Review of System Responsibilities, Financial Accounts, Warehouse, Purchasing - all operational.	More VDUs and Controller ordered.		rogress O.K.		Year-End unbalanced - written-off.	Some problems.	Cable faults reduced.			System fault - some data lost.
JUNE		Awaiting VDUs.	Problems linking Computer to text printer for reports.	ork on link to DIDOS. mendments to Branch tock Ledger.			Clerks and VDUs to be monitored to establish workload/staffing.	Invoices issued - some problems.	Clear run. Warehouse data input wrong. Response times slow.	More training. Printer performance investigated.	Back-up procedure reviewed.
JULY	Visit to USA. IBM communication devices disappointing.	Cancellation of Second System 38.									
AUGUST	Chairman recommends deferral of scanning because of error in MIS.		Problems - manual preparation of information. Checking of data.	omputer cheque runs egin.				Review required.			
SEPTEMBER	Agreed to defer scanning	Extra Disk required. IBM to review hardware requirements.	Errors in charging documents.	ntroduction of controls. ajor review required.				Stocktake satisfactory. Enhancements required.	Purchase order system 'Live'. Changes required by Buyers put on priority list.		

DATE	GENERAL	PDC's	LASER SCANNING
1982 AUGUST			Proposal agreed.
1983 MAY		Quotes for PDC's. Trial scheduled for June.	
JUNE		Report by work study officer.	
AUGUST		Training In-Store	Chairman proposes deferral.
SEPTEMBER		Manual written. Successful test transmission.	Proposal to defer scanning agreed.
OCTOBER 1984 FEBRUARY		Problems encountered. Board authorises purchase.	
MARCH			Pilot live in first store.
APRIL			Chairman's memo on exploitation & evaluation. DP Manager's report. Plans timetabled for second store. Personnel Director reports on checkout speeds.
MAY	DP Manager's memo on future development.	Implementation on target.	Agreement reached on positive solution for second store. DP Manager's memo on reconciling views. Memos by Personnel Director and Operations Director.
JUNE	DP projects prioritised. Finance Director resigns.	Implementation near completion.	Second store 'live'. Problems with barcodes.
JULY	2 new staff appointed for DP Dept.	Implementation in all shops. Review of extending capabilities to include frozen and chilled foods.	Outline review agreed. Report to be issued at end of August. Barcoding guns on trial in first store.
AUGUST	Total DP failure. Machine 'down' for almost a week.		Personnel Director's memo on checkout productivity.
SEPTEMBER			DP Manager's summary and outline of options. Chairman's memo requesting comprehensive evaluation.
OCTOBER			Personnel Director's memo.
NOVEMBER			DP Manager's memo on evaluation of 'hard' benefits. Two stores to be proposed early in 1985.
DECEMBER		Tested for chilled foods.	DP Manager's memo on system development in shops. Proposes meeting early in New Year.

P.D.C. TRANSMISSION RECORD SHEET W/E 9/6/84

DAY	SHOP	NUMBER OF ATTEMPTS	COMMENTS
MONDAY	HN	2	DIDN'T PRESS THEIR ENTER IN TIME
MONDAY	QC	4	ESTAB. LINE ERROR
MONDAY	NR	2	NOT CONTACTING
TUESDAY	NH	2	NOT CONTACTING
TUESDAY	LS	2	NOT CONTACTING
WEDNESDAY	NA	4	SYNC TIMING
WEDNESDAY	AX	2	NOT CONTACTING
WEDNESDAY	NR	2	NOT CONTACTING
THURSDAY	HN	2	FAILED
THURSDAY	XH	2	FAILED
THURSDAY	XD	2	FAILED
THURSDAY	NA	2	LINE ERROR
THURSDAY	NC	2	SYNC TIMING
THURSDAY	XY	2	ERROR IN DATA
THURSDAY	ZA	2	NOT CONTACTING
THURSDAY	AH	100	EVERYTHING
FRIDAY	AS	2	
FRIDAY	QS	3	ERROR IN DATA
FRIDAY	AD	2	FIRST TRANSMISSION
FRIDAY	HN	3	